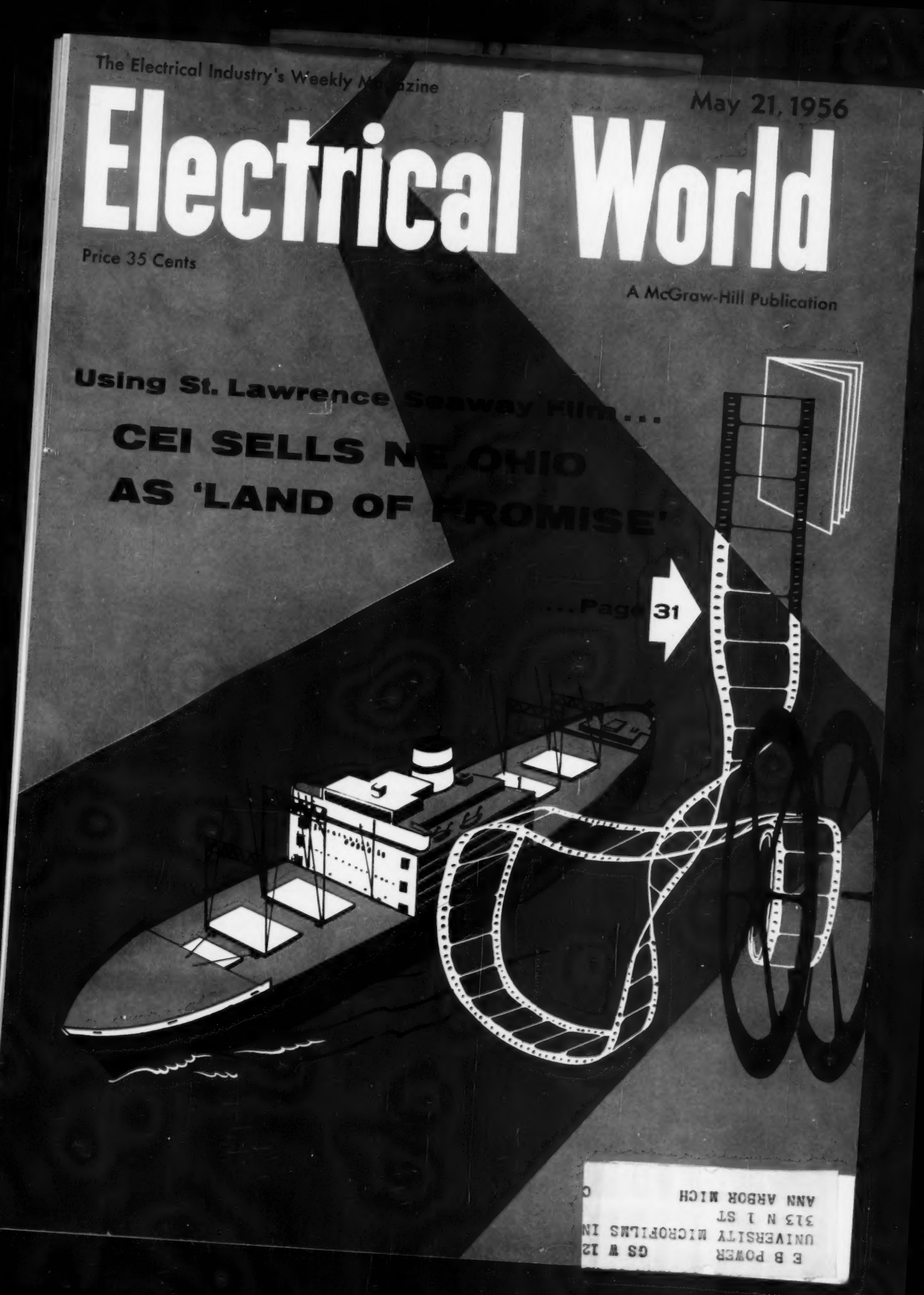
The Electrical Industry's Weekly Magazine

May 21, 1956

Electrical World

Price 35 Cents

A McGraw-Hill Publication



Using St. Lawrence Seaway Film...

CEI SELLS NE OHIO AS 'LAND OF PROMISE'

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E B POWER GS W 12
UNIVERSITY MICROFILMS IN
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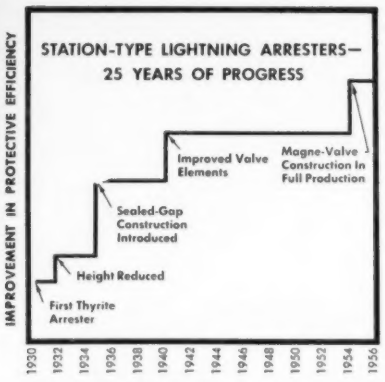
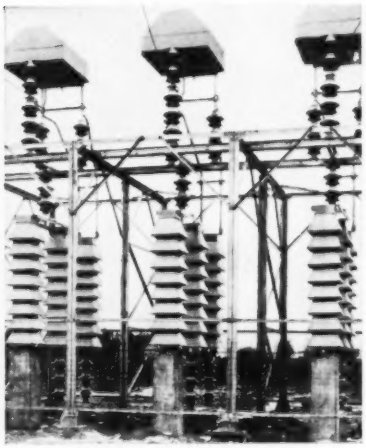
ANN ARBOR MICH

NEW "MAGNE-VALVE" ARRESTERS permit streamlining of power equipment protection, step up service continuity, and reduce maintenance requirements, according to W. J. Rudge, Manager—Lightning Arrester & Cutout Engineering, and R. T. Morris, Manager—Lightning Arrester & Cutout Sales, shown here in General Electric's High Voltage Laboratory, located at Pittsfield, Mass.



CONTINUED PROGRESS by G-E engineers has resulted in five major contributions in advancement of lightning arrester protective efficiency.



OLDER TYPES of arresters are subject to appraisal by utilities when checking the protective margins of aging power apparatus, and should be replaced by modern station arresters.

Are Your Station Arresters Obsolete?

Recent advances spotlight need for critical re-evaluation

Power apparatus installed on systems prior to 1935 generally was protected with a-c electrolytic and oxide-film arresters which offered the best lightning protection at that time. Since then, in some cases, both the insulation of important power apparatus and the condition of the old arresters may have depreciated to the extent that protective margins may be reduced to the danger point. In some cases little or no protection may now be afforded to equipment.

WITH CONTINUITY OF SERVICE vitally important to the operational success of utilities, not even one outage due to inadequate protection of important apparatus can be tolerated.

Since 1920 General Electric has made rapid progress in the development of superior protective characteristics in station-type arresters. This development was climaxed in 1954 by the introduction of the Thyrite* Magne-valve arrester, which produced a 134% *increase* in protective levels while obtaining approximately 33% *decrease* in cost over 1920 equipment.

Now, old station arresters can be replaced with modern Magne-valve arresters and, because of the major improvements in protective level afforded by the Magne-valve arrester, protection can be assured on the older equipment—in many cases even better than the original protective margin. And maintenance is virtually eliminated, compared to older arresters.

IN PLANNING NEW STATIONS or in weighing major apparatus investments already in operation, perhaps now is a good time to ask "Is our lightning protection equipment adequate to assure service continuity?" Assistance in reviewing present equipment protective levels is available from your local General Electric Apparatus Sales Representative. Or write General Electric Company, Section 301-325, Schenectady 5, New York.

*Registered trade-mark of General Electric Company.

MORE POWER TO AMERICA

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ELECTRICAL WORLD

Published weekly by McGraw-Hill Publishing Co., Inc., Executive, Editorial and Advertising Offices: **McGraw-Hill Building, 330 West 42nd Street, New York 36, N. Y.** Publication Office, 99-129 North Broadway, Albany 1, N. Y.

Donald C. McGraw, President; Paul Montgomery, Executive Vice-President; Joseph A. Gerardi, Executive Vice President and Treasurer; John J. Cooke, Secretary; Nelson Bond, Executive Vice President, Publications Division; Ralph B. Smith, Vice President and Editorial Director; Joseph H. Allen, Vice President and Director of Advertising Sales; J. E. Blackburn, Jr., Vice President and Circulation Director.

Subscriptions: Address correspondence to Electrical World—Subscription Service, 99-129 North Broadway, Albany 1, N. Y. or 330 W. 42nd St., New York 36, N. Y. Allow one month for change of address.

Subscriptions are solicited only from executive, supervisory, and engineering personnel in electric utilities, manufacturing companies, and related fields. Position and company connection must be indicated on subscription orders.

Single copies 35¢. For the United States and possessions and Canada. $6 per year, $9 for two years, $12 for three years. Other Western Hemisphere, and the Philippines $15 for one year, $25 for two years, $30 for three years. All other countries, $25 for one year, $40 for two years, $50 for three years. Entered as second-class matter at the Post Office at Albany, N. Y. Printed in USA. Copyright 1956 by McGraw-Hill Publishing Company, Inc. Permission required to reproduce any of contents.

Electrical World

Published for 82 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

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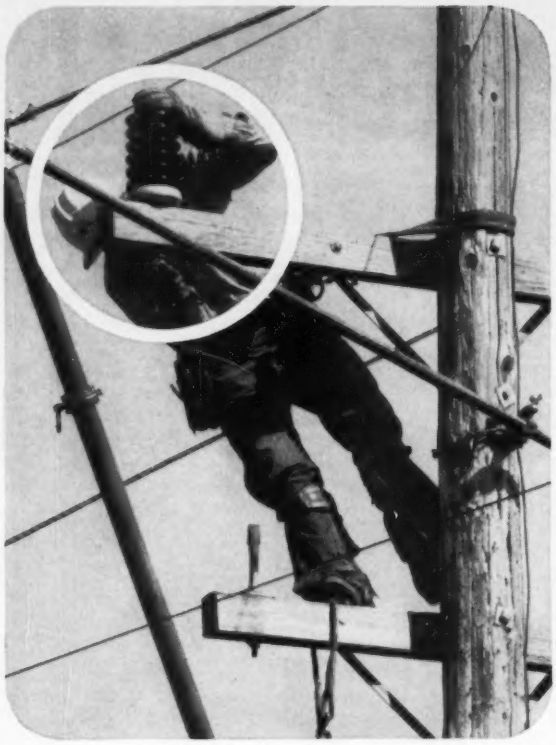
COMING NEXT WEEK—A special industry report will bring the industry up to the minute on the progress being made in atomic energy and will indicate likely progress in the near future.



SURE they can both be right

You make the choice-We supply the best of either type

One customer prefers O-B pintypes. He likes such advantages as protected leakage surfaces, wide-spaced shells that break up drip water, the fact that porcelain is the sole insulating medium, the multipart construction.

Another customer likes the advantages offered in the post design . . . exposed leakage surfaces easily washed by rain, neat appearance, elimination of sheltered area on the cross-arm.

Who's right? We think they both are. We know that either an O-B post or pintype will give excellent service—a fact well established by actual performance. Each has features that appeal to certain users. For a specific line, there may be good reasons for using one instead of the other.

We realize it's your job to pick the type you want, depending on the service requirements. Once you've picked the type it's our job to supply the best of that type. And we can do it, whether your selection be pintype or post!

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EDITORIALS

Sell Water Systems to Expand Rural Market

May is National Water Systems Month. Its sponsor, the National Association of Domestic and Farm Pump Manufacturers, hopes to whip up enough enthusiasm to sell a million units this year.

Water system people have good reason for optimism. The market is wide open. Only 63% of electrified farms in the U. S. have water under pressure. A promotion program stressing the real selling points for water systems should succeed even in today's soft farm economy.

Watered by automatic waterers, hogs gained 14 lb more in 10 weeks than others that were hand watered, according to U. S. Department of Agriculture tests; cows upped their milk output 10 to 15%. The farmer, without running water, spends the equivalent of 30 eight-hr days a year just toting water to his kitchen.

Utilities should not relax their efforts until every farm they serve has a water system. Surveys show that farm homes with modern plumbing use four times the kwhr of those without it. Modern plumbing in the home sets up a chain reaction worth $3,000 in related equipment sales. And areas with high water system saturation show high kwhr consumption.

Utilities would do well to survey their have-not customers and catalog why each is without a water system. Then they should apply individualized, face-to-face selling guided by the record. This may seem an involved and costly program. But it is justified economically by one very basic fact: On the farm without water under pressure, the full opportunity to sell other power-using devices will never come.

Pooling System Engineering Offers Gains

Pooling system engineering talent in a centralized group offers many benefits to the utility industry. Such a group, shorn of individual company affiliations, could attack each problem on its basic parameters. Its findings, derived from basic considerations instead of local conditions, could be adopted with confidence in every utility's expansion program.

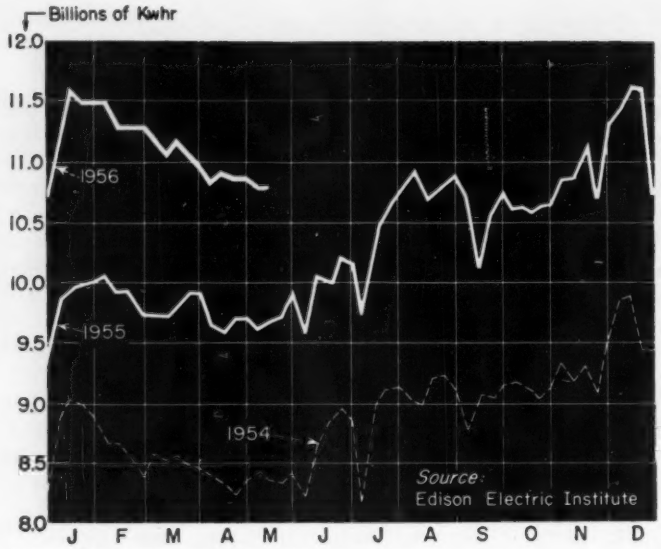
System engineering embraces many problems which need be solved but once. Among these are such time-consuming projects as evaluating the economic relationship between distribution transformers and secondary wire sizes and devising new design standards to cut distribution expansion cost. Such problems could be solved comprehensively for the entire industry by a small group of experienced engineers.

Individual utilities delegate engineers from their own dwindling forces to study system expansion. Some of this work must be geared closely to local requirements. But to the extent that it duplicates work done by other utilities, it is wasteful of critical personnel.

Several procedures suggest themselves for the centralized approach to system engineering. Existing committees of industry and professional associations have long served as exchanges for information derived from individual utility investigations. Occasionally they have sponsored working groups. They could logically set up more working groups to make the investigations and report recommendations back to the entire industry.

Another attractive procedure would be to assign the project to a competent consulting firm. Such firms frequently make extensive investigations to guide groups of clients. They could almost as easily report their findings to the industry.

Regardless of the method adopted, system engineering must be pushed relentlessly. Neither today's problems nor the growing shortage of engineers can be permitted to slacken basic planning. For planning wisely and building adequately are the industry's best assurance of future prosperity. Pooling its system engineering talent is the surest way to preserve this vital function against the inroads of expediency.



OUTPUT

Week ended May 12
10,837,000,000 Kwhr
Up 12.0%

Atomic Energy Commission requirements — 1,125,000,000 kwhr (Electrical World estimate). Excluding AEC, output increase was 9.1%

Per Cent Change From Previous Year

	Total US	New Eng.	Mid. Atlan.	Cent. Ind.	West Cent.	South-east	South Cent.	Rocky Mount.	Pacific NW	Pacific SW
May 12	+12.0	+11.3	+7.3	+16.9	+10.4	+9.8	+11.8	+14.6	+15.5	+10.6
May 5	+12.8	+12.9	+7.5	+18.9	+11.1	+12.3	+6.4	+13.6	+15.1	+11.4
April 28	+12.0	+10.2	+7.5	+19.4	+11.4	+12.7	+4.0	+10.5	+8.8	+9.3

Seasonally Adjusted Index 214.8 Week Ago 214.6 Year Ago 191.7

Issue's Highlights—Capital spending by U. S. business for new plants and equipment this year will top 1955 by 30% with utilities' plans showing 15% jump, according to McGraw-Hill's latest survey . . . TVA House-Senate conference committee agrees to let TVA finance new John Sevier unit with power revenues . . . World Power Conference set to meet in Vienna June 17 . . . Sen Herbert H. Lehman (D-N.Y.) takes to TV to push his bill seeking State Power Authority development of Niagara . . . Florida P&L scores victory in Lake City, Fla., as popular vote defeats proposal for municipal electric system.

No Coins in Pay Envelope—Con Edison of New York has adopted the even dollar pay plan for its employees. Henceforth pay will consist of bills only, no coins. Each pay check is rounded out to next highest even dollar. Each succeeding week, the amount advanced the previous week will be deducted from the net amount due and the round-out process repeated.

Latest Financing—Morgan Stanley & Co and Goldman, Sachs & Co group sells quickly $300 million General Electric 3½% debentures due 1976 to the public at 100.50% to yield 3.465% . . . Kidder, Peabody & Co group wins $12.5 million Pennsylvania Electric (A) first mortgage 3⅞% bonds due 1986 at 101.829%; reoffers at 102.604% to yield 3.73%. Same group wins 90,000 shares Pennsylvania Electric $100 par 4.60% preferred stock at $100.40; reoffers at $102.25 to yield 4.50%.

Rochester G&E Makes Changes—Alexander M. Beebee, president, last week was elected chairman and chief executive officer of Rochester G&E. Robert E. Ginna was moved up from executive vice president to president. Elected vice presidents were Ralph H. McCumber, in charge of electric and steam, and Linn B. Bowman, in charge of gas and transportation.

NEWS OF THE INDUSTRY BRIEFLY TOLD

Washington Wire—Joint Atomic Energy Committee hearings last week disclosed general agreement among all interested parties on one thing: The need for some sort of federal insurance program. But there is disagreement on nature of such government insurance. AEC Commissioner Lewis L. Strauss advocated government underwrite all liability that private underwriters will not take (over $65 million). Some committee members favored limited government participation. Public protection loomed as major concern. Detroit Edison's Walker Cisler believed private insurers would provide adequate protection for physical plant damage and workmen's compensation (see H. R. Searing below).

New Name for REA Post—David A. Hamil, speaker of the Colorado House of Representatives, is being considered by President Eisenhower as possible successor to Ancher Nelsen, former REA Administrator. Hamil, unsuccessful Republican candidate for governor in 1948 and a rancher, has been active in Colorado REA affairs for many years. Meanwhile, Nelsen wound up his last day in office by approving loans totaling over $24 million for REA G&T projects.

Storms Hit Utilities—Severe storms Sunday, May 13, disrupted the Ontario Hydro Electric system causing it to drop one million kw of generating capacity for a brief spell—including 578,000 kw at Sir Adam Beck No 2. This situation resulted in cutting off 200,000 kw of surplus power being fed into Niagara Mohawk's system by Ontario. Niagara's western division load was 600,000 kw at time. Suddenness and severity of trouble caused Niagara's Dunkirk and Huntley Stations to stall. Service was restored quickly by both Niagara and Ontario. Previous night, severe winds caused estimated $325,000 damage to Cleveland Electric Illuminating System. Service was interrupted to 25,000 homes, but company's emergency crews aided by crews from neighboring utilities, restored all breaks within 12 hours.

Clark Hill Dispute Settled—Georgia Power and federal government last week signed agreement whereby Georgia Power will wheel Clark Hill power for preference customers. Company will be paid wheeling fee by government. Preference customers, who will contract for power with government, will pay 6 mills/kwhr.

ABOUT PEOPLE IN THE INDUSTRY

In moving ahead with its plan to build a nuclear power plant, Consolidated Edison of New York intends "carefully to observe the requirements of safety," Pres H. R. Searing told Joint AEC. These requirements should be paramount, whether reactors are government or privately owned. "If they are neglected and serious accident occurs as result of unconsidered haste, reactor development will be delayed many years."

H. J. Scholz, president, Southern Services, Inc, has been named president of proposed Southern Electric Generating Co. SEG is being organized by Southern Co and will be owned 50% by Alabama Power, 50% by Georgia Power. J. F. Crist, Southern Co, will be executive vice president, and Walter Bouldin, Alabama Power, and J. J. McDonough, Georgia Power, will be vice presidents.

More News About People page 36

30% More Capital Spending Slated

- **McGraw-Hill survey reveals plans high above actual spending in 1955 with U.S. business marking $39 billion for new plant, equipment in '56**
- **Electric, Gas utilities plan 15% boost in capital expenditures for new plants and equipment, reversing decision last fall to spend 10% less**

U. S. business is launching a whopping expansion with plans to spend almost $39 billion for new plants and equipment in 1956—a 30% increase over capital spending during last year. And the big plans for the future extend on for the next three years.

This concrete indication of faith in the nation's booming economy was revealed by McGraw-Hill's recent survey of U. S. business (see table). For the first time since the surveys were started, plans two years ahead, in 1957, equal those for the current year. And plans for three and four years ahead are already within shooting range of the current level.

Most of the very large capital expenditures planned for this year are in manufacturing which is up more than 45% from 1955 with electrical manufacturers planning a 21% increase.

Public utilities, reversing plans last fall to spend 10% less in 1956 than in 1955, now plan a 15% boost in capital spending for this year. Mining plans are up 34%; petroleum, 11%; railroads, 62%; and "other transportation and communications," 33%.

Capital Outlay Will Be Heavy to Meet Sales, Improve Operation Rate

	Capital Expenditures (Millions of Dollars)						Sales	Operation Rate (% of Capacity)	
	Actual[1]	Planned	% Change	Preliminary Plans			Increase	End of	Preferred
	1955	1956	1955-56	1957	1958	1959	1955-59	1955	
Iron and Steel	$ 879	$ 1,600	+ 82%	$1,584	$1,331	$1,171	15%	98%	87%
Nonferrous Metals	293	653	+123	986	454	236	26	95	86
Machinery	809	1,092	+ 35	902	844	828	32	87	88
Electrical Machinery	436	528	+ 21	544	506	450	33	98	88
Autos	1,128	2,041	+ 81	1,654	1,042	1,042	15	96	81
Transportation Equipment (including Aircraft)	274	397	+ 45	318	251	233	34	74	80
Other Metalworking	729	1,059	+ 45	973	949	842	32	94	87
Chemicals	1,016	1,433	+ 41	1,576	1,513	1,468	39	90	92
Paper	518	948	+ 83	891	784	666	31	100	97
Rubber	150	224	+ 49	215	234	194	21	91	90
Stone, Clay, and Glass	498	706	+ 42	547	481	430	27	94	88
Petroleum Refining and Chemical	704	810	+ 15	1,045	961	788	17	96[4]	91[4]
Food and Beverages	718	802	+ 12	764	685	659	–	–	–
Textiles	366	381	+ 4	343	310	313	19	93	92
Miscellaneous Manufacturing	922	1,324	+ 44	883	807	855	17	–	–
All Manufacturing	**9,440**	**13,998**	**+ 48**	**13,225**	**11,152**	**10,175**	**24**	**92**	**89**
Petroleum Industry	4,992	5,542	+ 11	5,926	5,994	5,954	–	–	–
Mining	318	427	+ 34	325	331	302	–	–	–
Railroads	923	1,495	+ 62	1,136	1,022	991	–	–	–
Other Transportation and Communication	3,403	4,526	+ 33	4,586	3,972	5,048	–	–	–
Electric and Gas[2] Utilities	4,309	4,968	+ 15	5,459	4,763	4,413	–	–	–
Commercial	7,349	8,819	+ 20	8,466	7,873	7,479	–	–	–
All Business[3]	**30,030**	**38,965**	**+ 30**	**38,078**	**34,146**	**33,574**	–	–	–

[1] U.S. Department of Commerce; Securities and Exchange Commission; McGraw-Hill Department of Economics
[2] Gas utilities based on survey by American Gas Association, for 1956-59
[3] Petroleum refining and chemical plants, included under both manufacturing and petroleum industry, are counted only once in the total
[4] Petroleum refining only

The utilities' plans represent the greatest relative change since last fall's survey (EW, Nov. 14, 1955, p 108). Some utility spending proposed for 1955 was deferred until this year because of lags in delivery of generating equipment and steel for pipe lines. But present plans for 1956 also reflect many new projects approved during the winter.

The number of companies which were able to give specific plans as far ahead as 1959 was the greatest ever, comprising 88% of the survey sample. And in many individual companies and industries, the peak of these planned programs comes not in 1956 but in one of the following three years. This is particularly true of the electric utilities, the petroleum industry, and the domestic airlines.

Generating, T & D Rise Planned

Electric utilities already plan to increase their expenditures through 1957 and to spend almost as much in 1958 and 1959. In addition to a sharp increase in generating capacity to meet rising power demand the electric companies are spending much larger sums than in former years on transmission and distribution lines—also on motor vehicles, office equipment, and other general equipment.

"The great strength in the utility field," the McGraw-Hill survey points out, "is important in the long-range outlook for total capital spending. Because of the long time required to manufacture electric generating equipment, in particular, these programs are starting up more slowly than expenditures in manufacturing and will be completed later. This makes for greater overall stability in the total investment picture."

Basic Industries Set Big Outlays

The largest planned increases in capital outlay for 1956 came in some of the basic industries where expansion of capacity requires very large investment. The non-ferrous metals group plans a 123% spending rise; paper, 83%; steel, 82%; automobiles, 81%; various chemical process industries, 41%; machinery industry, 35%.

Expected sales increases always account for much of the expansion planned by industry. A 7% increase in sales this year over last is anticipated in the all manufacturing group and by 1959 a 24% increase over the 1955 volume has been predicted.

(*Continued on page* 63)

TVA Partisans Score Victory

. . . as House-Senate conference committee agrees to let TVA use its own revenues for construction of John Sevier unit

Partisans of the Tennessee Valley Authority chalked up a victory this week in an old, continuing dispute.

A House-Senate conference committee agreed, after a long stalemate, to let TVA use its own revenues for construction of a new generating unit at the John Sevier Steam Plant.

In doing so, the committee rejected an Administration request for a $3.5-million straight appropriation for a start on the new unit, which the Senate had voted for, and went along with the position of the House which said, in effect, the appropriation wasn't needed because TVA should use its own funds for the job.

'New Projects' Meaning Disputed

The amount, $3.5 million, is trifling as such things go; but the principle is an important one. The nine to seven conference committee vote wrote a new and important chapter in the ancient fight about the meaning of a 1948 rider on the TVA appropriations bill which limited TVA's use of its own revenue to "new projects."

TVA's friends and foes have never been able to agree on the meaning of "new projects." TVA partisans have taken the line that the phrase means new dams, steam plants, or just about anything else of major importance.

Moreover, in the case of John Sevier—where a steam plant is already in existence—they also held that the rider's terms do not bar expansion.

The counter argument—and this is the position taken by the Administration through the Budget Bureau—is this: Expansion or extension of an existing facility, as at John Sevier's steam plant, is not a "new project" and thus the House approach is at conflict with the law.

It was against this background that the House—first through an appropriation subcommittee, then the full committee, and finally on the floor—took steps to interpret the 1948 rider in TVA's favor. The Senate balked and voted for the Budget Bureau position.

To resolve the difference, each body appointed eight conferees. Beginning about a month ago, they went into a huddle and immediately split on straight party lines—with but one exception. Sen Allen J. Ellender (D-La.) took sides with the seven Republicans. The result: An eight-to-eight deadlock. This persisted until Sen Milton R. Young (R-N.D.) pulled a switch by crossing over to stand with the Democrats.

Deadlock Break Credited to Gore

Sen Albert Gore (D-Tenn.), TVA's most articulate and militant defender, is credited with the behind-scenes persuasion that convinced Young.

The result: A nine to seven vote for a report which adheres to the House position. The outlook is for smooth sailing through the House. The Senate may be a little tougher, but the Gore forces expect to win there, too.

What this new breakthrough by TVA's Congressional friends means for the future is not entirely clear.

At the very least, they figure, it will be a "powerful precedent" in future hassling. At the very best, they say, it could lead to ending finally the dispute about "new projects." It is clear that, in either case, they view it as a victory of the first magnitude.

NEWS BRIEFS

Reactor Radiation Insurance—A new organization, called the Nuclear Energy Liability Insurance Association, has been formed by 110 capital stock casualty insurance companies to underwrite radiation public liability hazards on industry-operated nuclear reactors and related operations. Syndicate members are expected to be able to insure up to $50-million coverage in third-party liability insurance for each reactor. Previous top limit ever offered was reported at about $10 million.

AEC Headquarters Contract Let—Atomic Energy Commission has awarded a $9-million contract to a Philadelphia building company for construction of new commission headquarters near Germantown, Md.

World Power Conference Set

. . . to hold fifth meeting in Vienna with Americans submitting 23 papers; over 130 from U. S. to attend June 17-23 event

Fifth World Power Conference, which will be held this year in Vienna, Austria, from June 17 to 23, has as its theme "World Energy Resources in the Light of Recent Technical and Economic Developments."

In addition to the 18 technical sessions during which over 260 papers will be discussed by delegates from more than 45 countries, the conference will feature a number of study tours throughout Austria.

Brigadier General Stewart E. Reimel (Ret.) has been designated chairman of the delegation representing the U. S. National Committee of WPC.

United States delegates to the conference include over 80 participants and more than 50 non-participants. Also attending will be seven of the 28 members of the U. S. national committee, representing professional engineering societies, electric utilities and industries, and government.

The technical program has been divided into five sections and will cover the present status and development of power production and utilization in individual countries; the preparation and conversion of fuels; utilization of primary sources of energy, including thermal plants, hydro-electric plants, and atomic energy; purification of waste water and exhaust gas in the production and use of energy; and international cooperation in the production and use of energy.

Approximately 23 papers will be submitted by United States delegates. These papers, and authors, include:

- Energy Resources of the United States—Ralph L. Brown, fuel technologist, Bureau of Mines, U. S. Department of the Interior.
- Hydroelectric Power Development in the United States—Frank L. Weaver, chief, Division of River Basins, Bureau of Power, and George G. Adkins, Hydraulic Engineer, Bureau of Power, U. S. Federal Power Commission.
- American Steam Power, 1950-1955—James N. Landis, vice president, Bechtel Corp.
- The Development of the Supercritical 4,500 psi Multiple Reheat Generating Unit for Philo—Philip Sporn, president, and S. N. Fiala, chief engineer, American Gas & Electric Corp.
- Technical Advances in Steam Boiler Design—Will H. Rowand, vice president in charge of engineering, and George W. Kessler, chief engineer, Babcock & Wilcox Co.
- Technical Advances in Steam Turbine Generator Units—C. D. Wilson, engineer in charge of steam turbine design, and L. T. Rosenberg, engineer in charge of turbine generator design, Allis-Chalmers Manufacturing Co.
- Technical Advance in Steam Generator Designs—A. M. Harrison, engineering manager, Transportation and Generator Division, and J. R. Carlson, engineering manager, Steam Division, Westinghouse Electric Corp.
- Progress in Steam Turbine-Generator and Gas Turbine Design from 1950-1955 by General Electric Co—Carl Schabtach, manager-engineering, large steam turbine-generator department, and Harold D. Kelsey, manager-engineering, gas turbine department.
- The Big Creek Hydroelectric Development—James F. Davenport, vice president and general manager, Southern California Edison Co.
- Status of Nuclear Technology—

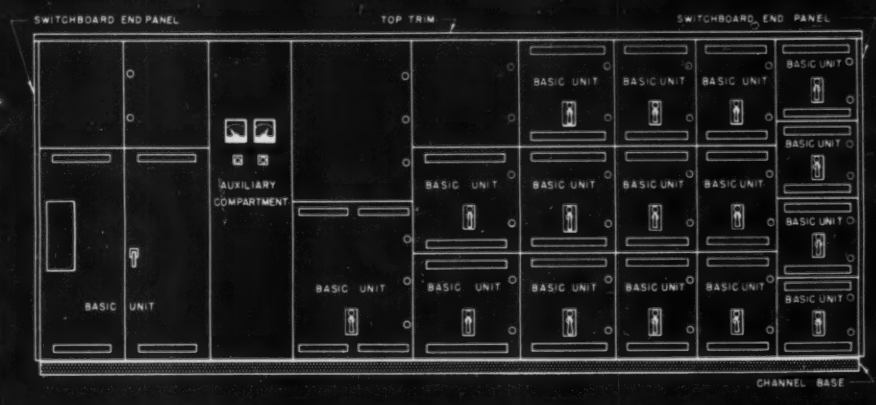
(*Continued on page* 63)

Engineering Career Booklet Offered

A brochure that urges high school students to ask, "Should I become an engineer?" and invites college engineering students to "look to the electric power industry for a career," is available to utilities for distribution. Put out by Line Material Co in a departure from a regular technical edition, the 24-page, four-color booklet is called "Your Engineering Opportunities in the Electric Power Industry."

By-lined articles by Harllee Branch, Jr, president of Edison Electric Institute and Georgia Power Co, and six other electric utility executives, tell about the varied, vital roles of electric utilities and their engineering opportunities. The success stories of 15 young representative utility engineers provide a sales-clincher. Copies are free for orders of 100 or less, and offered at cost for quantities above 100. To order, write L. A. Navarro, 700 West Michigan St, Milwaukee 1, Wis.

I-T-E Low Voltage Switchgear



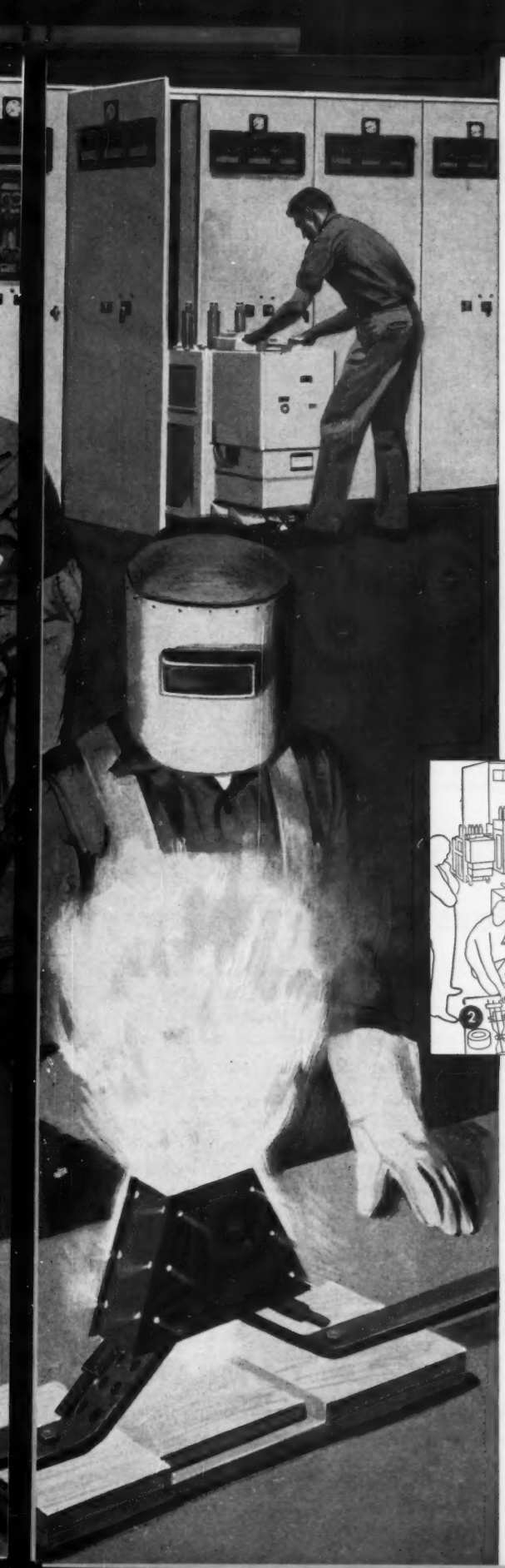
-- the finest of modern switchgear factory assembled, shipped as a unit, ready to install in your plant

I-T-E Low Voltage Switchgear provides the optimum in dependability, safety, reduced maintenance costs, and attractive appearance. I-T-E Circuit Breakers have proved their worth in thousands of applications. I-T-E Structures are designed specifically to house and interconnect these time-proved protective devices and auxiliary equipment. When you combine the two, you have the finest of circuit breakers in the finest of structures. And you get the additional advantages of less special engineering, faster delivery, and units custom-made in standard frames to fit your requirements.

For complete information, consult your nearest I-T-E sales office. Or write I-T-E Circuit Breaker Company, 19th & Hamilton Sts., Philadelphia 30, Pa.

I-T-E CIRCUIT BREAKER COMPANY • Switchgear Division

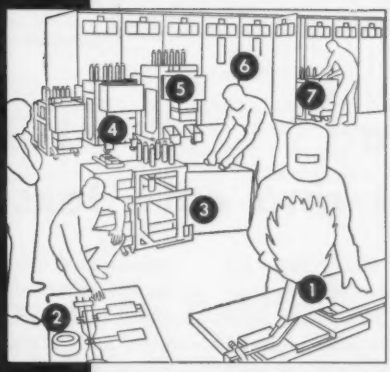
METAL-CLAD
SWITCHGEAR
SOURCE
POWER CIRCUIT BREAKER
OVERLOAD AND OVERCURRENT DEVICES
PHASE CURRENT TRANSFORMERS
POWER CABLES
GROUND OVERCURRENT DEVICE
MOTOR



General Electric offers you these "plus values" in the

MOST MODERN METAL-CLAD SWITCHGEAR AVAILABLE TODAY!

Pictured here are just some of the recent design improvements in G-E metal-clad switchgear that make it the most advanced metal-clad now on the market. Check with the descriptions below—you'll agree they add up to today's outstanding switchgear value!



1. NEW SELF-X—improved flame-retardant insulation with built-in fire protection is tested by electric arc.

2. BETTER MOTOR PROTECTION new through-type current transformer speeds ground-fault detection.

3. EASIER MAINTENANCE—removal of light box barrier completely exposes main contacts for inspection *without* removal of arc chutes.

4. HIGHER RATINGS— metal-clad switchgear now available with interrupting ability up to 750 MVA.

5. 5-CYCLE CLEARING TIME—limits damage due to faults and short circuits to a minimum.

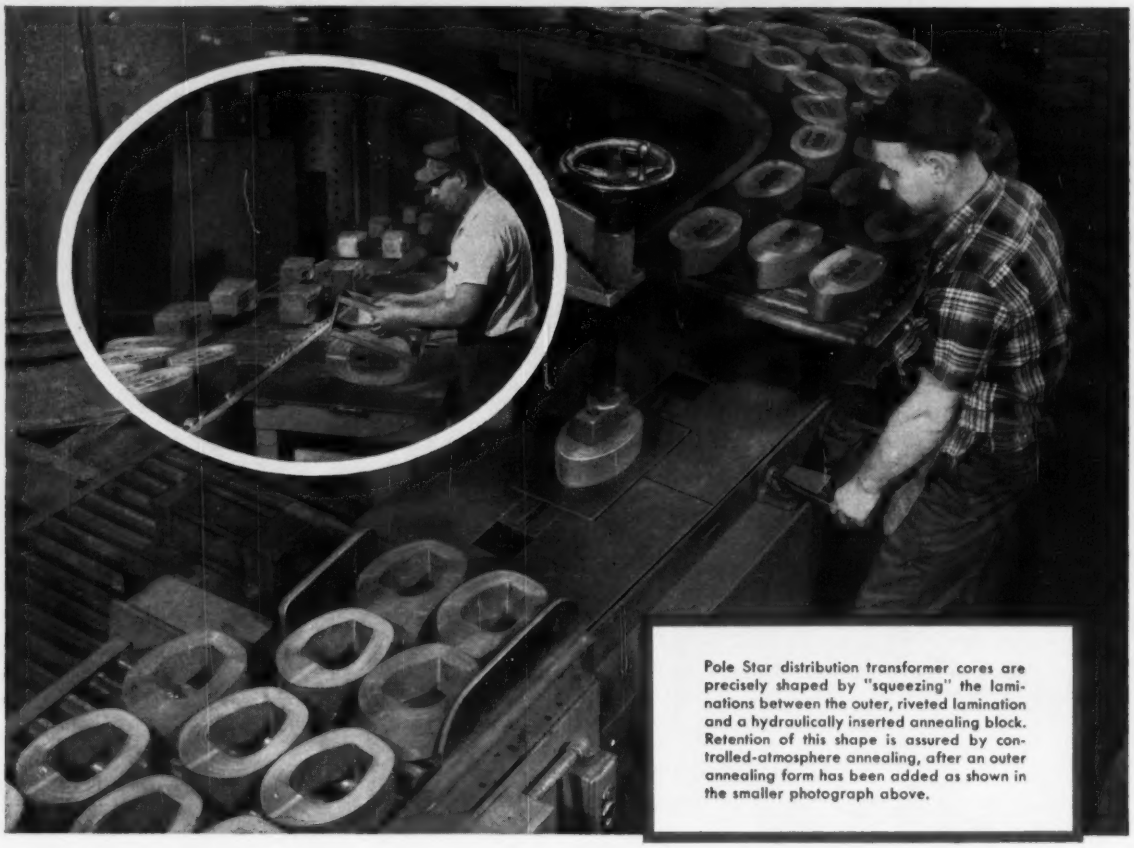
6. EXTRA STRONG ALL WELDED FRAME means switchgear enclosure will retain alignment despite jolts of cross-country shipment.

7. EASIER, SAFER HANDLING—low center of gravity due to vertical lift design virtually eliminates possibility of tip-over.

Subsequent ads in this series will deal with these features more completely. However, you can get more details immediately by contacting your G-E Apparatus Representative, or by writing for folder GER-1194, "New Design Improvements in G-E Metal-clad Switchgear" or for product descriptive bulletin GEA-5664, Section 511-15, General Electric Co., Schenectady 5, New York.

Progress Is Our Most Important Product

GENERAL ELECTRIC



Pole Star distribution transformer cores are precisely shaped by "squeezing" the laminations between the outer, riveted lamination and a hydraulically inserted annealing block. Retention of this shape is assured by controlled-atmosphere annealing, after an outer annealing form has been added as shown in the smaller photograph above.

Precision-shaping POLE STAR cores keeps exciting current and core loss uniformly low

After a Pole Star core is given its preliminary shape by forming dies, the outer lamination is riveted into position and an annealing block is inserted into the window of the core by means of the hydraulic press pictured above. By thus "squeezing" the laminations between the annealing block and the outer lamination, the core is precisely shaped in accordance with predetermined specifications for the particular size. The laminations, which had been cut to progressive lengths for telescoping of the individual pieces, are uniformly lapped.

Both the finished core shape and the uniform laps are figuratively "locked" in place by the stress annealing operation that follows. Annealing in controlled-atmosphere furnaces also insures retention of the inherent qualities of the grain-oriented steel. Any adhesions that may be formed during annealing are eliminated later, because laminations are separated from each other as they are placed in the coil and individually re-lapped.

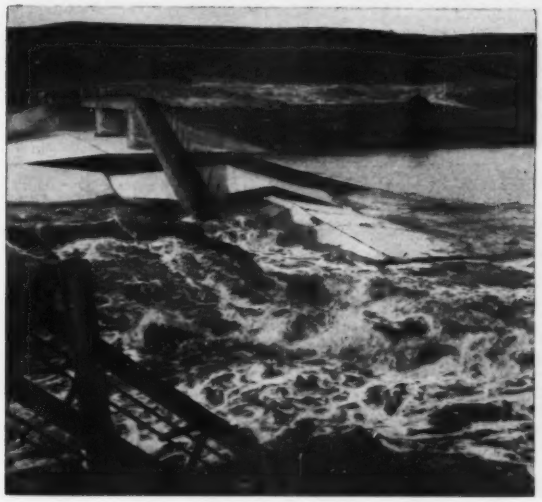
Such rigidly controlled production means that the advantages of Pole Star's patented lap-on-top core are as consistent as they are outstanding. The individually lapped laminations create a large cross-section area at the lap that reduces the density and prevents a concentration of flux. The absence of gaps or butt joints assures a low exciting current. High interlamination resistance, plus the absence of adhesions, keeps core loss at a low value.

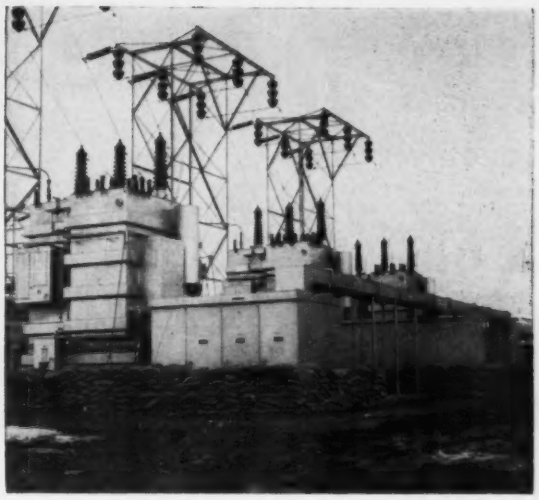
167 Production Controls make Pole Star Best!

PENNSYLVANIA TRANSFORMER COMPANY

A McGraw Electric Company Division **CANONSBURG, PA.** *Greater Pittsburgh District*

Pole Star Transformers are available in all standard single phase distribution sizes from 3 through 500 kva, through 67,000 volts.





Spring Floods Strike Dam, Prompt Precautions

The threat of heavy spring floods, which recently washed away 3,000 cubic yards of reinforced concrete in a 38-ft overflow spillway (left) on the Battle River near Forestburg, Alberta, has led Pacific Power & Light Co to take precautionary steps by sandbagging its Yakima (Wash.) substation (right).

The Battle River spillway break, which cost an estimated $350,000 in damages, was caused by a small hole in the downstream face. Investigators believe the hole was caused by a break in a bypass pipe through dam. The spillway is part of an earthfill dam built to impound cooling water for a nearby thermal power plant under construction by Canadian Utilities, Ltd.

Sandbags around the River Road substation, Yakima, are designed to prevent flooding from the nearby Naches river, a major tributary of the Yakima which feeds the Columbia River. Although company officials have said the likelihood of major outages has been prevented by PP&L's variety of feeder sources and system of loop supply, the sandbags are planned to guard against interference with automatic controls and temporary outages.

Flood threat to many northwest communities has also brought assistance from North Pacific Corps of Engineers, Portland, Ore., which has allocated $654,500 for advance work on 20 weak points, especially on the Columbia.

Anticipating the spring runoff, Bonneville Power Administration has issued advance notice to 12 industrial customers operating 16 Pacific Northwest plants that reduced hydrohead at federal dams during peak flooding of the Columbia in late May and early June could force curtailment of interruptible energy deliveries. There is no indication of any need for firm load curtailment, however.

Florida P&L Wins City Battle

. . . against municipal plan advocated by Mayor Hagan and others as Lake City endorses private service 3 to 1

Stirred-up citizens of Lake City, Fla. (population 8,000) recently struck a heavy-handed blow for private power. With an almost 3-1 vote they defeated a proposal that the city take over Florida Power & Light Co's local system.

The proposal was voted down 1,808 to 672. Backed by Mayor Murray Hagan and his three city commissioners, the defeated plan included construction of a city-owned diesel generating plant costing from $3- to $5 million and a status quo rate structure.

Helped by old-timers' recollections of a bungled municipal job 30 years ago (poor service finally forced the sale of Lake City's plant to the company), and facing its first municipal ownership fight since 1944, Florida P&L waged an effective battle.

Marshalling all the facts available on municipal ownership of electric systems, the utility took the case to the people via radio and newspapers. And a citizens committee of some 60 business and civic leaders opposed the municipal system as a step toward socialization.

On the other side, advocates of the plan—mostly city officials—waged an intensive campaign on the theory that a city-owned utility would pay no taxes and, therefore, would prove a good money-maker.

But the opposition, spearheaded by the citizens committee, was too strong. The attack against the proposal centered around the uncertainty of electric rates. Regulation of rates under municipal ownership does not exist in Florida, and consequently there would be no protection against rate increases.

Another objection was that a small city plant could not provide dependable service and might even become obsolete in a few years with atomic power developments.

When the votes were in, Florida P&L's Pres Robert H. Fite hailed the election results as a resounding endorsement of American free enterprise.

Industry Progress Revealed as . . .

5 EEI Engineering Committees Meet

- Fewer sizes, wider loading range, and elimination of taps promise distribution transformer savings
- Countershock devices to stop fibrillation being built
- Failure to use gloves not glove failure is cause of shock and burn fatalities
- Need for better reliability is swinging protection emphasis from equipment to service
- New 150-Mw subbasement substation uses six 69-13.8-kv unbused banks to bolster Manhattan network
- Ontario Hydro installs six unique reversible pump-turbines without wickets at Sir Adam Beck No. 2 station
- Meter manufacturers promise load survey systems tailored to machine analysis

Deliberating this month, major engineering committees of Edison Electric Institute came face to face with growth problems of an industry driven by an expanding national economy.

Some of their solutions are listed above. Others developed in sessions of the Transmission and Distribution, Electrical Equipment, Hydraulic Power, and Meter and Service Committees at Chicago and the Accident Prevention Committee at St. Louis are summarized:

T & D Delegates Seek Future Savings

Sweeping re-evaluation of distribution transformer practices was proposed to the Transmission and Distribution Committee by A. J. Pansini, Long Island Lighting Co, as a route to future economies. Proposals included:

1. Adopting fewer sizes to cover the distribution load range. Examples cited were 5, 15, 50 and 167 kva or 10, 37½ and 100 kva.

2. Accepting a wider range of loading.

3. Eliminating taps to cut manufacturing cost and failures, except in the 6.9 to 8.4-kv range where a few taps might promote standardization.

4. Mass producing units suitable for field grouping like shunt capacitors to match load demands.

5. Changing primary terminals to permit use on poles or underground.

The manufacturers' reaction to Pansini's proposal was presented by M. L. Manning, Pennsylvania Transformer Co. He observed that distribution transformer production already shows a trend away from small sizes although the 5 to 50-kva bracket comprises 90%. Larger units cost less per kva and require less losses and maintenance. He saw additional savings from standardizing on three or four ratings.

Eliminating taps makes a better coil, Manning continued. Reliability is improved and the transformer can be sealed. He observed that 50% of production now falls in the 7.2 and 7.6-kv range. Less than the present four taps could achieve standardization in this range.

Survey Secondary Problems

Mass promotion of central air conditioners will create new problems, warned J. W. Anderson, Philadelphia Electric Co. A survey of eight manufacturers disclosed locked-rotor currents at 230 v up to 107 amp on 3-hp 1-phase units and to 155 amp on 5-hp. He urged utilities to check units sold to their customers.

Higher secondary voltage cannot offer sufficient savings to justify use to serve the next 30 million homes, asserted D. K. Blake, General Electric Co. His remarks were based upon comparison of 240/480-v with conventional 120/240-v systems. Autotransformers for lighting and small appliance loads are a desirable feature, he admitted, but their cost is hard to justify except at high load densities.

But R. F. Lawrence, Westinghouse Electric Corp, urged pressure on EEI and NEMA to investigate the effect of higher service voltage on appliances to determine which is the "right" voltage. If this investigation leads to a new voltage standard, concluded Lawrence, then each utility can decide whether and where to apply it.

In discussion, T. C. Duncan, Consolidated Edison Co, reviewed savings offered by higher secondary voltage in commercial buildings. F. A. Cox, Commonwealth Edison Co, described conversion of apartment building wiring to 277/480-v supply with autotransformers at each floor to provide 120/240-v service to appliances and outlets. Application to five buildings saved an average of 60% in rewiring costs and boosted revenue.

Triplex aerial secondary cable costs no more installed than conventional secondaries, reported R. M. Grogan, Long Island Lighting Co. Triplex costs more, but installation costs are only half because men have only one quarter the items to handle. Advantages of triplex secondaries include: Improvement in service continuity; reduction in pole space; reduction in maintenance costs, particularly where hot sticks are used for primary work; and improved appearance.

Rising labor costs make it easier to justify mechanized equipment costs, said R. V. Nuss, Pennsylvania Power & Light Co. Since 1952 his company has reduced common labor from 33% to 19% of the total labor force and has speeded construction through more extensive use of mechanized equipment. Labor saving equipment described by Nuss included panel forms for concrete, cranes for tower erection, a special steel hauling rig, a hole digger with 66-in. auger for digging tower footing foundations, and a special tool trailer for ACSR splices which reduced wire stringing costs 26.6%.

The Committee on Extra High Voltage Cable will seek unusual insulation to combine stable operation with high strength, low pf, and low charging current, reported Herman Halperin, Commonwealth Edison Co. He predicted the $½ million spent on the program should prepare the industry to use cable up to the 330-380 kv expected within 15 years.

Aluminum conductors are competitive with copper in pipe-type cable at present prices, said H. R. Nash, Detroit Edison Co. Test installations on 2,250 MCM compact segmental cable show that compression connectors provide satisfactory joints even at 90C conductor temperature. And aluminum sleeves flash-welded to copper studs show promise for terminations.

Continuing temperature surveys are necessary to assure operation of underground conduit and cable systems within temperature limits, said C. A. Bauer and D. D. Nagley, Commonwealth Edison Co. For temporary relief they recommended flooding ducts but said soaking the ground above the conduit is also satisfactory. Forced air cooling has not been satisfactory where conduits are over 200 ft. Permanent relief is most frequently had by installing larger conductors. But replacing soil with gravel or coarse sand also has merit, they said.

Trichlorethylene used with dry ice to accelerate the freezing of oil in pipe cable during repair has safety drawbacks, according to J. A. Pulsford. If pipe casing is wet with trichlorethylene when arc welded, ozone from the arc may combine with the chemical to produce lung irritating phosgene. J. L. Smith, Commonwealth Edison, suggested the use of liquid silicone which produces no gases, cost $1,500 for 50 gal but can be used indefinitely.

AT ACCIDENT PREVENTION session; Vice Chairman I. R. Dohr, Consumers Power Co; Chairman R. W. White, PG&E; and Dr. W. B. Kouwenhoven, Johns Hopkins

Safety Experts Report Progress

Heart defibrillation, shock and burn accident statistics, rubber glove testing, the placing of accident prevention responsibility, and TV antenna hazards were among topics discussed by the 87 utility safety men at the Accident Prevention Committee meeting in St. Louis on May 3-4.

In the work on heart fibrillation and defibrillation with counter shock much progress has been made, according to Dr W. B. Kouwenhoven of the Johns Hopkins University. Of 173 defibrillation experiments on dogs, only one was a failure.

Two sets of defibrillation equipment are being built, Dr Kouwenhoven said. They will consist essentially of a 3-kva transformer, a foot switch, and a mechanized timer. They will be set to apply 4 to 6 amp at 440 v for 20 to 30 sec. He indicated the device would be safe to use on anyone.

A wide variety of schedules for and methods of testing rubber gloves was reported by committee members. One company had not been making any electrical tests but is making plans to. The consensus of members was, however, that test schedules and methods were of little importance compared to the problem of getting gloves and other rubber protective equipment used at the proper time.

Electric shock and burn accidents were responsible for 76.1% of the fatalities in 1955 according to reports received to date, said S. H. Young in reporting for the subcommittee. Reports have provided evidence to back up those who believed in the "ground-to-ground" rubber glove rule and those who advocated rubber sleeves. Hand or arm contact were responsible for 67% of fatalities, shocks and burns.

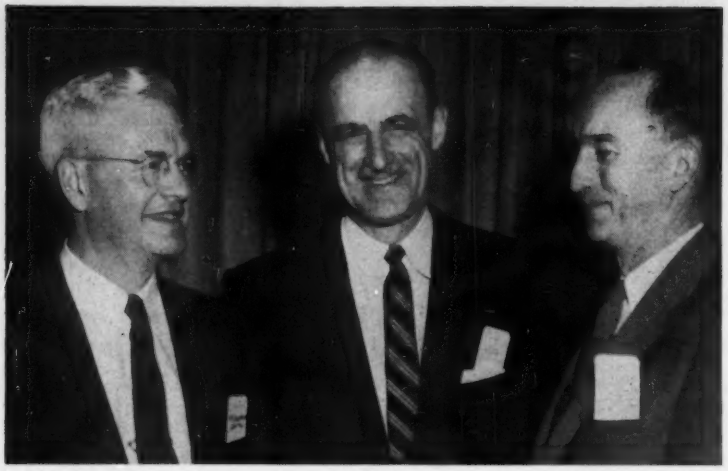
In 1955, 68 fatalities were due to shock and burn accidents, none resulting from defective protective equipment, according to reports.

An analysis of all shock and burn accidents indicated that head contacts were involved in 28% of the total, indicating distinct advantages for the insulated hard hat. Use of rubber sleeves would have prevented six of the arm contacts studied.

Linemen's climbers are being tested by a reflectoscope and ultrasonic sound to detect cracks resulting from metal fatigue, J. C. Egg, J. T. Witt, and A. A. Pace, Duquesne Light Co, reported. The equipment, bought to make metal fatique tests in the power plant, produced best results of any method used. In the first test of all climbers used by the company's linemen, 22 cracks were located.

Increase in work volume, more vehicles on the streets, and higher driving speeds accent the need for a planned protection of work areas, W. Leone, Consolidated Edison Co of New York, said. Since 1948, although work area accidents have gone up 20%, in New York, street work has gone up 59% and employee injuries have decreased 50%. As part of this program barricades, flashing and steady red warning lights, are used to warn motorists. Stanchions support the lights in high and low positions. White barricading tape and flags and signs are used.

Forty-four companies reported 135 accidents involving TV antennas.



ELECTRICAL EQUIPMENT Committee OFFICERS are H. E. Deardorff; Dayton Power & Light, vice chairman and C. L. Derrick, Hartford Electric Light Co, chairman. With them, right, is Carl Asbury, Commonwealth Services Inc, program speaker

EEI Equipment Group Weighs Protection

Today's demand for high-quality service can be provided only by a carefully planned, well-designed, and well-protected system. As this emphasis on high-quality service has increased, the major change that has been wrought in the philosophy of system protection has been a shift from the protection of equipment to the protection of service.

In reviewing philosophy of system protection for the Electrical Equipment Committee, Carl E. Asbury, Commonwealth Services said overcurrent and ground relays properly applied and set, together with instantaneous relays and automatic sectionalizing, can usually provide reliable protection for distribution circuits.

As transmission moves to higher voltages and larger conductors, Asbury saw a growing trend toward installation of more high-speed differential protection with high-speed automatic reclosing. He also foresaw increased need for high speed bus protection and sectionalizing of major transmission buses.

Two features mark as unique the design of Con Edison's West 38th Street Substation in New York's garment district, T. D. Reimers said. They are:

1. The six 69/13.8-kv transformer banks are at no time paralleled in the station at 69 kv or at the 13.8-kv network feeder supply voltage.

2. The 150-Mw station is in the subbasement of a 43-story building.

Studies made it apparent that savings would result from elimination of paralleling busses, bus tie breakers, transformer breakers, and reduction in feeder breaker interrupting capacity. It was also indicated that initial contingency loadings were reduced for a station having six 69-kv feeders, transformer banks, and 13.8-kv bus sections with three normal 13.8-kv feeders per section.

Reasons cited by Reimers for establishing a 69/13.8-kv non-bussed substation were these:

1. System load growth required a new 69/13.8-kv substation in mid-Manhattan in 1956 to relieve the load on Waterside Station.

2. Transfer of an 80-Mw network area to this new station, supplied by 69-kv feeders from East River Station, would require 69-kv changes there.

3. Completion of the Socony-Mobil Building on 42nd Street at Lexington Ave would add 8,500 kw of load in one building.

The second draft of a report on electric system load forecasting was presented to the Electrical Equipment Committee for discussion by J. W. Schroeder, Illinois Power Co, chairman of a three-man working group on load forecasting. The report is an unusually comprehensive and complete outline of methods of making electric utility load forecasts of kw and kwhr in general use by utilities

Development of the Upper Raquette River by Niagara Mohawk Power Corp in five separate generating stations will make available over 100,000 kw of additional peak load capacity. First two of the new plants, South Colton and Five Falls, went in service in 1954 and 1955. Rainbow Falls, Blake Falls, and Stark will follow in 1956 and 1957, W. C. Van Dyke said in discussing electrical features of the project. All five stations are designed for unattended operation under supervisory control from the district operator's office.

A unique feature of the stations is the protection of outdoor totally enclosed motors against condensation by continuously circulating a low-voltage current through the motor winding using special step-down transformers. This circuit is automatically cut out whenever the motor is energized at 480 v for normal running, Van Dyke told the committee.

Pump Storage for Niagara

A unique design of reversible pump-turbine with diagonal-flow runners of a so-called "feathering Francis type" that makes wicket gates unnecessary was described for the EEI Hydraulic Power Committee by J. K. Sexton, Montreal Engineering Co.

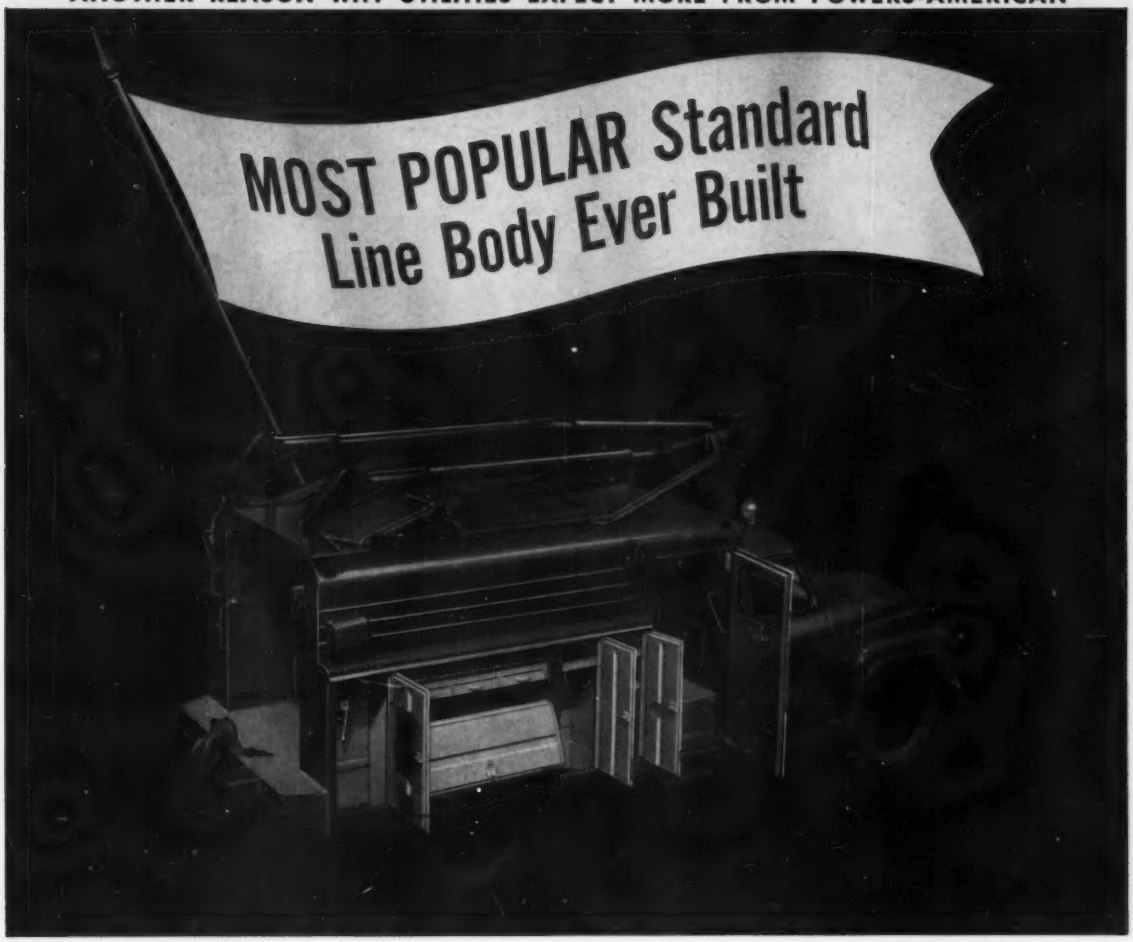
Six machines of this type are used at Ontario Hydro's Sir Adam Beck Power Plant No 2 at Niagara Falls to fill and draw-down a pump-storage reservoir of 15,500 acre feet. In these units runner blades fit the scroll case contour so closely in closed position that leakage is held to 50 cfs. Dewatering the scroll case on starting as a pump or turbine is unnecessary with blades feathered.

Operating as pumps the units are rated 55,000 hp at 60-90 ft head. As turbines they deliver 40,500 hp at 80 ft head. Reservoir level varies 25 ft and can be filled or drawn down in 7½ hours. The reversible units take water to the Beck Plant forebay and discharge it to the 100,000-hp units at the main Beck No 2 plant through a head of 292 ft.

Other recent developments in hydraulic turbine design were reviewed for the committee by W. J. Rheingans, Allis Chalmers, who showed a new short film of the pump-storage plant of TVA at Hiwassee.

(*EEI Meetings continued on page* 22)

ANOTHER REASON WHY UTILITIES EXPECT MORE FROM POWERS-AMERICAN



POWERS American® Series 800-C

LINE CONSTRUCTION AND MAINTENANCE BODY

"Isn't that a custom-made body?" That's what utility men often ask when they see the pace-setting 800-C. And, it's easy to understand why . . . for here's a body with more "most-wanted" features than any *standard* model on the market. Features such as partitioned sliding drawers, extra shelves, extra bins, "full-opening" doors, and 56″ wide cargo area . . . just to mention a few.

Crews really go for the 800-C crew compartment—with its easy-riding seats, adequate leg room, and well-ventilated comfort in winter or summer.

Available in lengths of 11′, 12′ 3″, and 13′. . . or without crew enclosure, in 11′ and 12′ 6″ lengths. Can be furnished with any *Pole-Master* Hydraulic Derrick or with conventional derrick equipment.

✦ Descriptive literature and prices will be sent on request

The Series 800-C Body shown here is equipped with a *Pole-Master* PM-2 Hydraulic Derrick . . . one of three different *Pole-Master* Derricks available in sizes for handling poles from 40′ to 75′ in length.

Powers-American Division

McCABE-POWERS AUTO BODY COMPANY

5900 NO. BROADWAY • ST. LOUIS 15, MO. 625 CEDAR STREET • BERKELEY 10, CALIF.

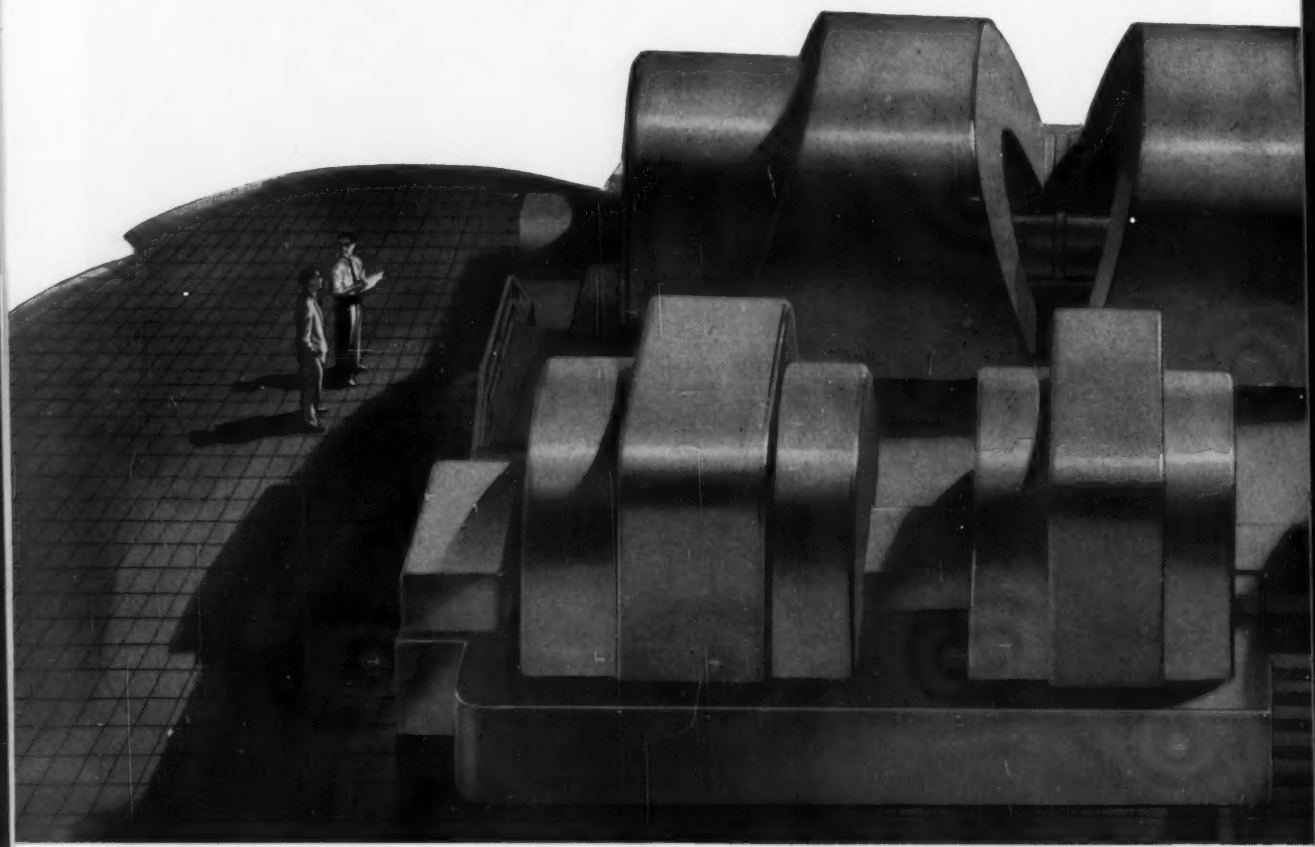
300,000-Kw Steam Turbine Generator

New In Power

The illustration below shows a model of a 300,000-kw steam turbine generating unit being built by Allis-Chalmers for Detroit Edison. Its capacity is far higher than that of any steam turbine generating unit yet built. It is capable of supplying the needs of a city of half a million people.

When this new unit goes into operation, the total capacity of the Detroit Edison system will be more than 3¼ million kilowatts — double the system's capacity of ten years ago.

Many features of this unit are examples of Allis-Chalmers developments that help utilities keep pace with our expanding economy. The unit is close-coupled, cross-compound reheat design, with two generators, one on the 3600-rpm shaft, one on the 1800-rpm shaft. The 3600-rpm generator is fully supercharged, taking advantage of an



A-C ALLIS-CHALMERS

ALLIS-

EEI ENGINEERING MEETINGS

Paces Utility Progress

Era Generation

Allis-Chalmers development that makes possible higher capacities and smaller relative sizes.

The fully supercharged 3600-rpm generator is rated 206,470 kva, 0.85 power factor, 0.80 short circuit ratio, at rated hydrogen pressure. The 1800-rpm generator is a conventional hydrogen-cooled machine that is rated 171,765 kva, 0.85 power factor, 0.80 short circuit ratio, at rated hydrogen pressure. Operating steam conditions are 2400 psig, 1050 F at inlet; 1000 F reheat; and 1 inch Hg absolute exhaust pressure.

* * *

If you would like more information on Allis-Chalmers steam turbine generating unit developments, your nearby Allis-Chalmers office will be glad to arrange a discussion at your convenience. Or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

A-4794

CHALMERS

METER AND SERVICE officials conferring here are F. A. Salmon, Central Power and Light Co, EEI vice chairman; G. J. Yanda, Cleveland Electric Illuminating Co, EEI chairman; and R. B. Swallow, Public Service E&G Co, AEIC chairman

Metermen Study Program Economics

The real test of economy in a meter program is whether it requires less revenue to support than any alternative program, P. H. Jeynes, Public Service E & G Co, told meter engineers. Many programs have been established from economic premises which are partly correct; complete determination must reflect these facts:

1. The entire cost of a meter installation must ultimately be repaid from revenue.

2. Depreciation depends upon rate of return on the initial installed cost, the meter life expectancy curve, and salvage value less removal cost.

3. Meters remaining in service are never 100% depreciated even though their age exceeds their expected average life.

4. Meters, and the revenue to pay for them, are both taxed.

5. Repairing old meters is justified as long as the cost for expected remaining years of service does not exceed the cost of using a new meter for the same period.

Design of a test rack conceived by Cincinnati G&E Co to verify new meter accuracy at a cost of less than 10¢ each was described by J. S. Linebach. Its development was the outgrowth of company conviction that it has a responsibility to know the accuracy of meters going on customers' premises.

Ensuing discussion of the merits of 100% verification of new meters compared with a 10% sampling check culminated in a committee poll. It showed 17 companies required by law to verify 100% of new meters, 4 companies not required to, verify 100%, 5 companies not required to, do sample testing, and none completely eliminating new meter testing.

Among new metering developments presented by manufacturers were:

1. A polyphase, dual-range, combination thermal demand watthourmeter announced by Duncan. A companion to the company's dual-range single-phase thermal demand meter, it is available in all 3 or 4-wire ratings to 200 amp.

2. A line of printing demand meters to supersede the existing PD 5 introduced by General Electric Co. It will take up to 999 pulses per demand interval and is to be available in bottom-connected, socket, and switchboard mountings.

3. Also announced by GE was a new contact-making device used as an attachment on the company's watthourmeter to provide impulses for all impulse-type demand meters. It will be in two types: Low-impulse rate and high-impulse rate developed to take advantage of the high impulse capacity of the new printing demand meter.

4. A load survey recorder was announced by Westinghouse. It records on magnetic tape impulses proportional to load on one track and time impulses on the other. A separate translator totalizes load impulses for each time interval and feeds it to a summary card punch machine.

5. Another device introduced to speed load survey work was Fischer & Porter Co's digital demand recorder and tape reader. It produces a visual recording on tape of contact closures from the contact-making mechanism of a watthourmeter. This recording may be automatically translated to punched cards by a tape reader.

Revisions in the National Electrical Code will probably require 60-amp service entrances for residences but recommend 100 amp, advised J. A. Morris, American G&E Service Co. They will also include the recent uprating of bare-neutral service entrance cable to 300 v to ground.

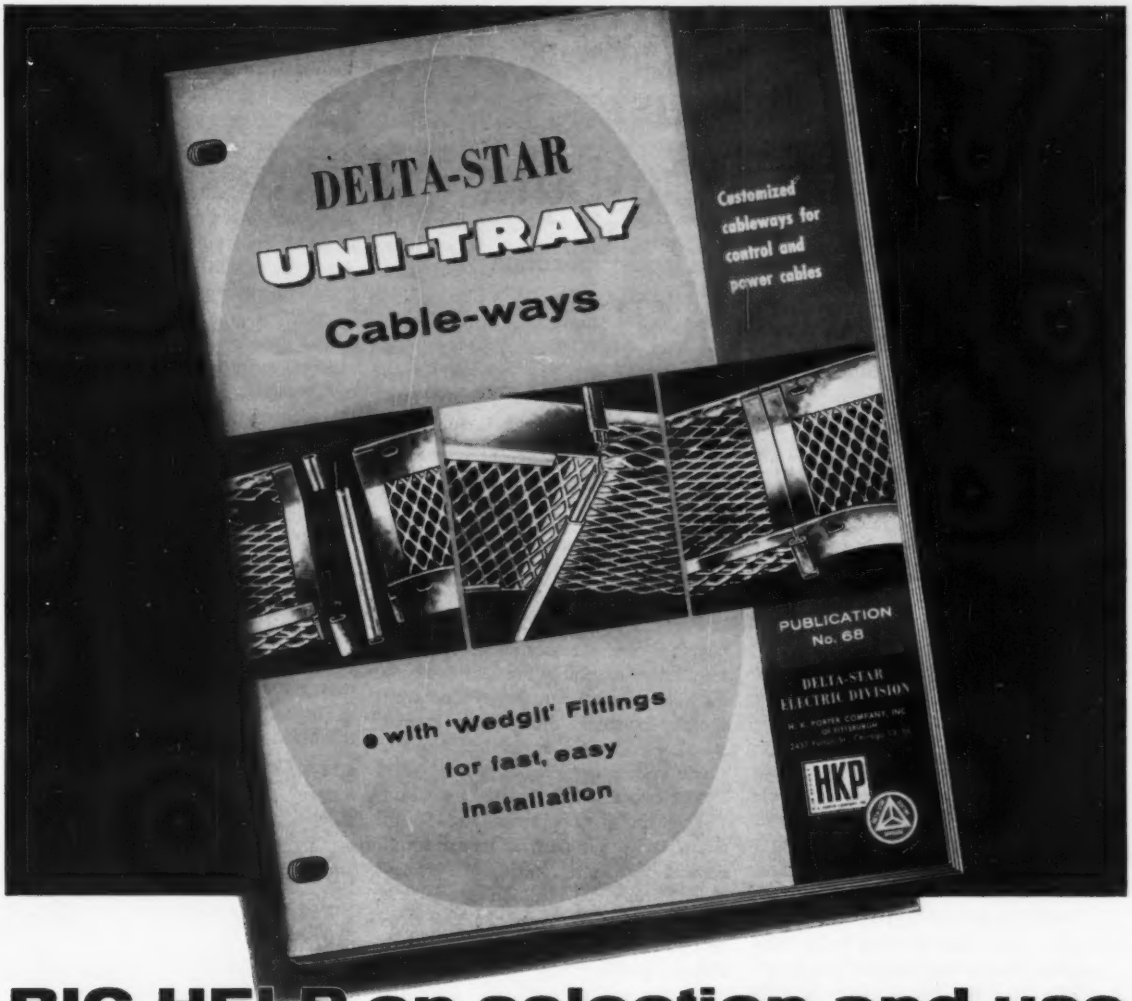
Service connections of 1/0 conductor are metered by 15-amp extended-range meters on appropriate sockets, reported F. H. Rogers, Baltimore G&E Co. Con Edison uses transformers for wrie sizes over 2/0, P. W. Hale commented.

"Keep the Road Open for Engineers"

Putting a firm finger on a sore subject, Col H. S. Bennion, EEI's retiring managing director, himself an engineer, had this to say to EEI engineering committees in farewell about attracting and holding young engineers:

"The power business is an engineering business. It is a good place for engineers to find satisfying work . . . But today utilities have a low standing with engineering schools and graduates. The responsibility for correcting this situation rests squarely with engineers now active in the industry," the Colonel said.

"Keep the road to advancement open for engineers, right to the top. Wisely lend a helping hand . . . Take the trouble to teach and guide . . . Don't misplace help and be sure your help is wise. Think back to those who helped you and learn how to help in turn. The bread you cast out will come back."



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Puerto Rico Must Triple Electric Output

Island's power growth rate soars as industrialization drive boosts economy, raises the living standards

E. T. ELLENIS, Commonwealth of Puerto Rico Economic Development Administration

One of the fastest growing power systems in the world can be found in a 100-mi long, 35-mi wide island in the Caribbean which up to ten years ago was creaking along on a sugar and tobacco farming economy. The island, Puerto Rico, has a higher per capita consumption of power than any country in South America, including oil-rich Venezuela.

Moreover, the hundreds of factories which have opened in Puerto Rico since 1950 have helped to increase power consumption 79% in five years, a gain greater than that turned in by the U. S. mainland (about 66%).

With an eye to further industrialization and resultant better living conditions, Puerto Rico power specialists predict that the island's energy consumption will triple in ten years, compared with forecasts that U. S. needs will double within the same period.

Electricity in Every Home?

Backing these forecasts, the Puerto Rico Water Resources Authority, the government agency which runs the commonwealth's integrated power system, has blueprinted a seven-year, $108-million expansion program designed to keep one step ahead of industrial and commercial demand and also to move farther toward a long standing goal: The eventual electrification of every home in Puerto Rico.

"Of 400,000 homes on the island, 265,000 now have electricity. With expansion of facilities we hope to put electricity in virtually every Puerto Rico home within ten years," reported S. L. Descartes, executive director, Puerto Rico Water Resources Authority.

The $108-million expansion program, he added, will provide capacity for total power generation at a two billion-kwhr annual rate compared with the current annual rate of about one billion kwhr.

1955 Was Big Year

For the authority 1955 was a big year for many reasons. In July the Legislative Assembly brought two new districts under the authority's control, thereby virtually integrating Puerto Rico's electric power facilities into a single system.

The two districts: Isabela Irrigation District in the northwest and South Coast Irrigation District in the south central portion of the island. By acquiring these $14-million properties, the authority increased its total assets to $192 million and saw hydroelectric capacity rise 10%.

By the end of 1955, the authority was serving more than 300,000 customers in 75 cities and towns through a 6,000-mi transmission and distribution grid originating from more than 25 generating stations, most of them hydro units. Hydro generation, however, contributed only one-fifth of the total output during 1955.

Revenue Rose 10% in Year

The authority's 1955 record was a good one as it picked up 19,711 new customers, delivered 854 million kwhr compared with 736 million kwhr in 1954. Revenue rose from $20.1 million to $22.4 million.

Here are the latest developments:

- On the north coast the San Juan steam-electric station will add 40,000-kw to its current 120,000-kw capacity by the end of 1956.
- On the south coast the authority has just commenced the operation of a 20,000-kw unit in the Yauco hydroelectric plant.
- In the southwest a massive power-irrigation project is now nearing completion. It includes two hydroelectric plants with a combined 28,000-kw capacity.

The project will reclaim 26,000 acres, provide flood control, and develop 100 million kwhr of energy each year. Area covered is 250 sq mi, using waters from 69.3 sq mi of drainage area. It will include six 60-100 ft high concrete gravity dams, 65,000 lineal ft of grade and power tunnels.

The authority plans to spend $26.4 million, most of it to pay for north coast expansion in 1956. The remainder of the $108 million, will go for generating, transmission, and distribution facilities planned for:

1957—A new 40,000-kw steam electric unit on the south coast.

1958—A 20,000-kw gas turbo-generating unit at Mayaguez in West Puerto Rico.

1959—A second 20,000-kw unit at Mayaguez.

1960—A 40,000-kw steam electric unit, site as yet unknown.

Since Puerto Rico began to industrialize in order to raise its standard of

LARGEST POWER PLANT on island is Puerto Nuevo outside San Juan. Its capacity will be doubled to 176,000 kw by end of 1956 to meet anticipated power needs

living and its job opportunities, electrical power consumption in the commonwealth has been growing at a rate 40 to 50% faster than on the mainland, with the island's production rate doubling every five years.

Contributing to this stepped up power demand are the 350 U. S. mainland manufacturing affiliates which have come to Puerto Rico in recent years and which have created 65,000 direct and indirect jobs. As a result, with more money in their pockets, more Puerto Rican families can now afford appliances, not to mention the 70,000 television sets already in Puerto Rican homes where they are as popular as on the mainland.

Pointing to better living conditions is this authority figure on residential usage gain in 1955: Home consumers used, on the average, 8% more electricity in 1955 than in 1954.

Extension of power lines into rural areas with lower initial average consumption tends to slow down this rate of increase.

Gains in electrical power consumption mirror new hope afoot in Puerto Rico today. There are still 100,000 unemployed, but government officials are confident that enough new jobs will be created by further expansion of U. S. industry in Puerto Rico, plus continued growth of local business, to cut down the figure appreciably.

By continuing to offer local tax exemption and other help, plus pointing out that federal taxes do not apply, this self-governing commonwealth freely associated with the U. S. is actively promoting its industrial opportunities. Puerto Rico's Economic Development Administration, with offices in New York, Chicago, and Los Angeles, has been charged with this mission.

Use of Energy Is Low

Despite the more rapid rate of expansion of Puerto Rico's capacity to produce and consume electric power, the level of consumption per capita remains far below that of the U. S. mainland. For example, whereas average per capita income in the mainland was four times that of Puerto Rico, U. S. rate of consumption of electric energy was nine times greater than that of Puerto Rico.

The gap would be even greater if all forms of energy consumed were considered. The U. S. uses a great quantity of oil and coal which are not first converted into electricity.

The differential between per capita income and per capita use of electric power illustrated the problem facing most economies which are trying to catch up with the more advanced nations.

However, if, as in the case of Puerto Rico, funds from the mainland are available to a public utility for investment on almost the same terms as they are for a mainland system, it is possible for expansion to take place in direct relation to the increases in demand for new capacity.

The main factor controlling the rate of investment in new capacity for power production then is determined by the efficiency of the operation as it appears to potential investors. The fact that Puerto Rico Water Resources Authority has had little trouble in obtaining funds for expansion would seem to indicate that mainland investors have reached the conclusion that the Authority has been efficiently operated in the past and that its securities are a sound investment.

Illustrating confidence in the authority's performance, mainland financial circles have purchased 82% of authority revenue bonds of $103,862,000 now outstanding.

On the authority's operational efficiency, the Puerto Rican Planning Board said in a special report to the United Nations Conference of Peaceful Uses of Atomic Energy:

"The Puerto Rico Water Resources Authority produces energy at a cost of eight mills per kwhr in the San Juan steam plant. This is comparable with the cost of production in the New England states. Because most of the facilities for transmission are fairly new and the distances involved are relatively short, the transmission losses are held to a level of about 13%, again a relatively low figure . . ."

Atom Power Seen Desirable

Looking ahead to atomic power, the report concludes that construction of a nuclear power plant in Puerto Rico would be both feasible and desirable but that such an atomic plant would not radically change the type of mainland manufacturer now expanding to Puerto Rico.

In 1940, when Puerto Rico first turned to industrialization as a means of solving socio-economic problems, per capita consumption of electricity was wobbling along at 80 kwhr per year. Last year it was 400 kwhr.

ANTONI LOUCCHETTI dam and reservoir is one of the main units in vast southwestern hydro-irrigation project which is spread over 250 sq mi of island territory

E. I. GALLAGHER, left, outgoing chairman, and J. G. Miller, his successor

New and Unique Steam Stations Described

PEA Prime Movers Committee learn about design details of power plants planned by utilities in area

Papers on new and unique steam station designs were featured at the Pennsylvania Electric Association Prime Movers Committee meeting held at Skytop, Pa., April 26 and 27. Conventional, supercritical pressure, and nuclear power plant designs were discussed.

Leading off the meeting, J. H. Harlow, Philadelphia Electric Co, gave a progress report on the new Eddystone supercritical pressure unit. Initial design called for a 275-Mw 3,600 rpm tandem compound unit (EW, Nov. 15, 1954, p 114), but subsequent studies indicated that a cross-compound machine would improve heat rate 200 to 300 Btu per kwhr because of the better exhaust annulus of the low speed turbine. Last stage blades of this turbine will be 44 in. long.

In describing the 5,000-psi steam generator, he indicated that 65% of the heat is absorbed in the superheater and reheat sections. The fact that no blow down is possible presents a difficult water purity problem. To solve it, Eddystone will have a mixed-bed demineralizer preceded by a two-bed demineralizer.

The condenser hot well will be sectionalized to permit quick detection of even small leakage and isolation of the section containing contamination. This contaminated condensate can then be treated by demineralization and returned to the feedwater heating cycle.

Met Ed Plant Design Unique

A monotube steam generator, cross-compound single flow axial exhaust turbine, and a side entry condenser will be used in the Portland Station of Metropolitan Edison Co, according to a paper by D. R. Rees and J. G. Miller. The steam generator is designed to deliver 1,150,000 lb of steam per hr at 2,400 psi, 1,050F superheat, and 1,050F reheat. The unit will be rated at 150 Mw nameplate with expected capability of 165 to 170 Mw.

Miller said that reduction in turbine exhaust loss because of elimination of the 90-deg bend in the condenser connection may reduce turbine heat rate about 30 Btu per kwhr. He added that the recovery of velocity energy in the exhaust neck entering the condenser will reduce also the heat rate. The amount is indefinite until tests can be made to determine the shape of the turbine-condenser connecting piece for maximum recovery of velocity energy.

Linden Station is expected to achieve a substantial improvement in economy without an increase in steam conditions, according to L. Winkleman and R. Smith, Public Service Electric & Gas Co (EW, April 9, p 16). The station will supply steam and electricity to the nearby Esso oil refinery and in return will receive fuel and raw water.

According to Smith, who presented the paper, the economy of operation is good because the plant has two unusual uses for low level heat energy that is normally rejected to condenser cooling water. These uses are: **1.** The heat required for the refinery processes. **2.** The heat required to raise the temperature of the large makeup.

The station will consist of two units. First unit will have three boilers (to insure reliability of delivering steam to refinery) and will be rated 225 Mw with steam conditions of 2,000 psi and 1,050F. Second will be of unit design, also rated 225 Mw but with steam conditions of 2,350 psi, 1,100F/1,050F.

Basic design practice of Long Island Lighting Co engineers is to install units as large as practical to take advantage of the lower cost per kw, to utilize as fully as possible the company's existing sites and to lengthen the time between construction of new units, according to W. J. Burns. Two factors play an important part in the economic planning: **1.** The low annual system load factor of less than 50%. **2.** The disposition of population and load concentrated in the western 30 miles of a 120-mile long territory.

A. C. Stanojev, Duquesne Light Co, said a centralized control room will be used at the Shippingport nuclear power plant. Main controls will be located on a three-section console board. Three feet to the rear of this console will be a vertical board containing essential plant operating records, reactor control rod position indicators, and trouble annunciators. Graphic representation utilizing colored symbols and mimic bus will be used.

No Condemnation Law in Delaware

High ground close to deep water and rail and transmission line facilities make the site for the new Indian River Station an ideal location for a power plant, said R. B. Mullen, Eastern Shore Public Service Co. In describing the site development, he indicated that the nearness to an existing transmission line (2½ miles from a main line) was particularly important because no right of condemnation exists in Delaware.

E. M. Sommerfield, United Engineers & Constructors, Inc, said that the frequency of hurricanes in the area was one of the reasons why an indoor plant will be used.

SELKYD–a new kind of plastic improves watthour meter base plates

and Sangamo brings it to you!

In order to find the ideal material from which to mold watthour meter base plates, Sangamo and Glaskyd, Inc., pooled their efforts.

The result is Selkyd.*

A Selkyd base plate on a watthour meter has many advantages. It resists corrosion. It has a high resistance to arc tracking. Having great impact strength, a Selkyd base plate will stand up to physical punishment. And because Selkyd is an inert organic substance, base plates made from it have great dimensional stability.

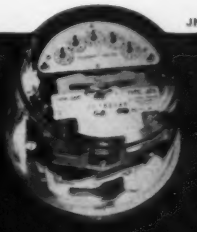
Adoption of this Selkyd base has in no way altered the electrical characteristics of the J2.

Every Sangamo J2S meter you buy will come to you with a base plate made from this remarkable new plastic . . . and at no extra cost.

Selkyd base Sangamo meters will be shipped to you sealed. You'll find them so accurately calibrated . . . so solidly built . . . that no adjustment is necessary.

** A thermosetting resin combined with glass fibers—in contrast to ordinary phenolics having wood fibers as a filler.*

JM56-

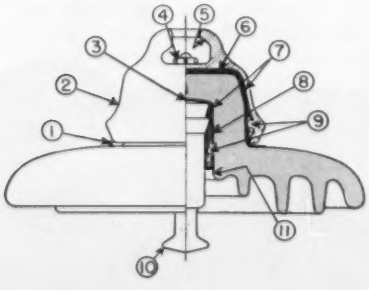


SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS

Triple-Tested...

Stainless steel pin, for use in high-contamination or coastal areas. Available in all suspension insulators on special order.



One of Illinois' outstanding porcelain products is this 10-inch suspension insulator. The cutaway view shows some of the features that assure quality.

1. Ample clearance between edge of cap and top of porcelain shield.

2. High-grade malleable cap, treated to prevent embrittlement when galvanized. Forged steel cap also available. Galvanizing is closely controlled in our own plant.

3. Treated fibrous washer provides a cushion between end of pin and porcelain.

4. Spring brass cotter key.

5. Smooth socket, accurately manufactured to standard dimensions.

6. Resilient compound provides cushion between bottom of cap and top of porcelain.

7. Resilient compound applied on inside of cap and outside of pin.

8. Sanded surfaces (controlled particle size).

9. Cemented joint between hardware and porcelain is neat portland cement.

10. Forged steel pin, accurately gauged to standard dimensions. Also available in stainless steel for use in high-contamination or coastal areas.

11. Radio glaze treatment available if desired, though these insulators meet satisfactory radio noise-level requirements without treatment.

Illinois Electric Porcelain... Triple-Tested To Insure Extra Mechanical And Electrical Strength

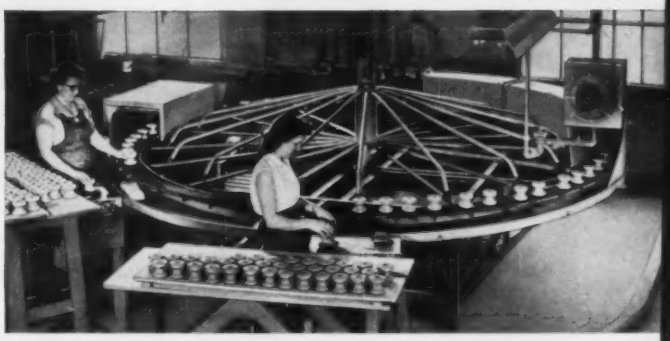
1 Complete laboratory control of materials.

2 Extensive new quality-control system.

3 Rigid final testing.

All combine to insure extremely high quality in the finished porcelain insulators.

by **W. V. SWAN**, Vice President
Illinois Electric Porcelain Company



Here's one of the newest developments at Illinois Electric. On this huge wheel, spool and pin type insulators and wireholders are automatically glazed on all sides and partly dried by warm-air circulation, insuring uniform, complete glazing.

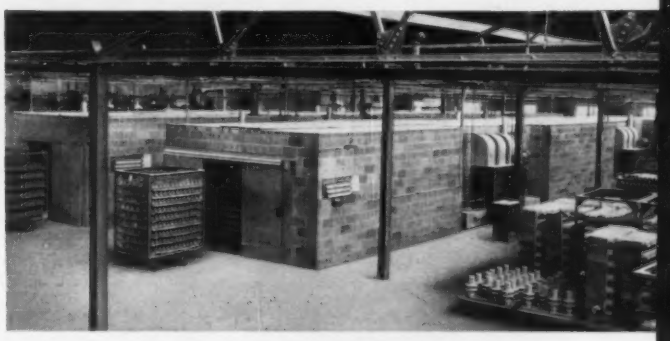
In the two years that Illinois Electric Porcelain has been under Line Material Company operation, we have made extensive changes, from one end of the plant to the other.

A completely new ceramic laboratory has been built, containing the latest equipment for testing raw materials and production methods, and for developing new tests to assure customers that they will get insulators of extremely high quality.

Accurately Controlled Production

The latest precision production machinery has been installed. New, accurately controlled molding, pressing, drying, glazing, and firing equipment assure much more uniform production, and porcelain of greater uniformity in density and strength.

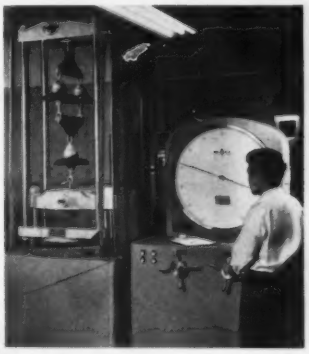
Our facilities include our own completely new, modern galvanizing plant for insulator hardware and fittings. This assures accurate quality control under our own supervision.



Two huge automatic dryers gradually dry the formed porcelain. Heat and humidity are automatically controlled as the ware slowly passes through the dryers. This provides strong, dense ware, free from internal stresses.

Amply Meet EEI-NEMA Standards

The result is that, today, porcelain insulators shipped from this plant are among the highest quality available in the industry. You can buy them with full assurance that you are getting porcelain insulators second to none. They meet EEI-NEMA standards with an ample margin of safety.



Suspension insulators are subjected to simultaneous mechanical and electrical test to destruction—a test performed on a representative quantity of insulators to insure high quality.

A corner of Illinois' complete new ceramic laboratory. The laboratory contains the latest equipment for analyzing materials and testing production processes.

Get Complete Information

Illinois Electric Porcelain Company products include porcelain insulators, hardware, and fittings. These products are sold through Line Material Company. Ask the L-M Field Engineer for complete information, and a copy of the informative Bulletin DL8; or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

ILLINOIS ELECTRIC PORCELAIN COMPANY

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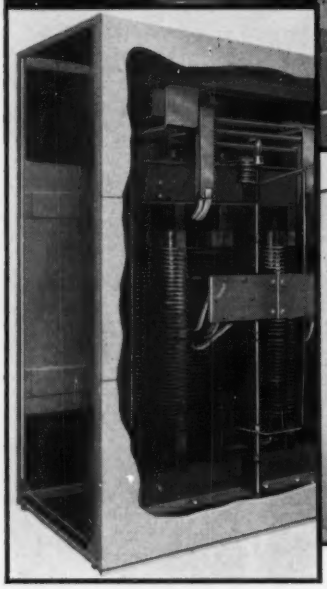
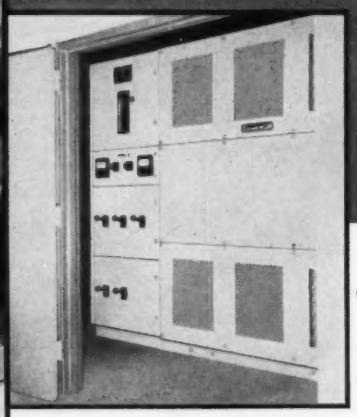
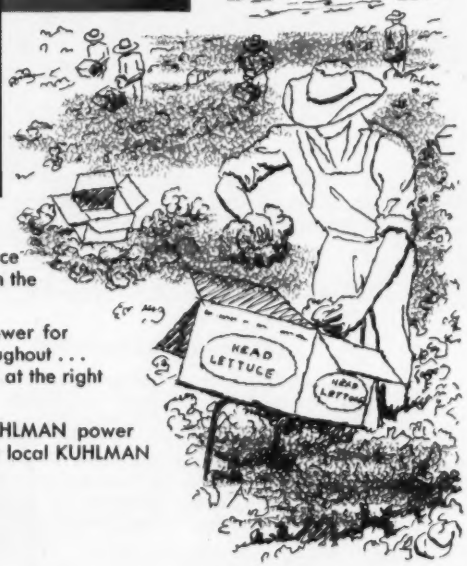
POWER CENTER TRANSFORMERS







Packed in cartons in the field and refrigerated . . . California lettuce reaches any part of the world as fresh as the day it was picked . . . with the help of KUHLMAN power.

The KUHLMAN 750 KVA power center, illustrated above, supplies power for one of California's ultra-modern lettuce packing plants. KUHLMAN throughout . . . a network of small dry type transformers puts power where it is needed at the right voltage for each carton manufacturing operation.

Specify KUHLMAN for your plant modernization . . . you'll find KUHLMAN power centers can meet your special requirements. Get all the facts from your local KUHLMAN representative.

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Good movies . . .
Visual aids . . .
An alert staff of contact people . . .
Direct mail—are tools with which . . .

CEI Sells NE Ohio as 'Land of Promise'

R. C. HIENTON, Vice President in Charge of Marketing, Cleveland Electric Illuminating Co, Cleveland, Ohio

On Dec. 16, 1954, "Land of Promise," a motion picture featuring the impact of the St. Lawrence Seaway, was given its first showing in a studio at Cinecraft Productions, Inc, Cleveland.

Since that day, "Land of Promise" has been seen by over 20 million people. The top executives of growth companies from New York to San Francisco have watched the picture at private showings. And within Northeast Ohio, more than 600 civic organizations and service clubs saw the film during 1955.

Those are impressive figures, but they tell very little regarding the true effectiveness of this 28-minute full-color motion picture produced by the Cleveland Electric Illuminating Co.

Why, you may ask, should a public utility serving a relatively small area spend considerable money to publicize a project which will affect the entire Great Lakes region and every harbor on the lakes?

The answer is simple and well supported by history. Since the beginning of marine transportation, the port at the head of any new waterway has always grown fastest, prospered the most.

When you consider that the Seaway's authorized 27-ft channel extends only to the western rim of Lake Erie, it's easy to see why Northeast Ohio's four great ports—Cleveland, Fairport, Ashtabula, Conneaut—have been labeled "head ports" of this historic new waterway. Suffice to say, those four ports are the transportation nerve centers of a 1,700-sq mi strip of lake shore land served by the Illuminating Co.

The big job assigned "Land of Promise" was to inform America's growth companies of the enormous opportunities which we felt the St. Lawrence Seaway will offer plants located in the 1,700-sq mi area.

Film Aims at Education

That may sound as if the movie's main function was educational. In a way, it was. But CEI was after more than that. It was after definite "leads" which area development people could follow.

A "lead" is a company with new plant plans. The firm may have a location in mind, or it may be "looking around". In any event the company is a definite prospect. There is no way of knowing how many "leads" will result in new manufacturing operations for the area as a plant location decision is based on dozens of factors. There have been cases where a relatively minor factor has taken a plant away from one area and put it a scant 50 miles away.

Area development men tell the story of the company president who journeyed to a small western town which his staff had recommended as the No. 1 location for the firm's new plant. It was snowing when he checked into the best hotel in town and turned in for the night. Next morning, when the company president looked out of his hotel window, he noticed that the streets hadn't been cleared. It was 9 AM. At that moment, he decided his new factory would not be built in a town with such an "inefficient" snow removal system.

Actually, this story isn't so ridiculous as it may sound. Community attitudes play a key role in industry's opinion of a possible plant location.

Such are the vicissitudes of area development work. In fact, CEI development people have found that it takes from one to eight years between the time that a company decides and the time it actually starts to build.

This may sound like quite a span and, coupled with the area development "stories" just mentioned, may imply that plant site evaluation is a rather haphazard process for modern industry.

Far from it. There will always be a few companies who build a plant in a certain location because the president's wife has hay fever or the chairman of the board likes to shoot grouse. But for most operations plant site selection has become a highly developed science.

Du Pont, for example, has a special plant location committee of 17 experts—each representing a different consideration in site evaluation. They have even developed a scoring system for possible plant sites so that each site being considered gets an exact numerical rating based

upon how well it fits the economic and technical requirements of the plant to be built.

As plant location has become more and more of a science, area development people have had to sharpen their selling tools. Generalities regarding an area's locational advantages don't get far with today's "specific-minded" plant site evaluation teams. They want facts—ungarnished and solidly based.

Film Chosen As Best Medium

All these points of importance were in mind when some of the key people in the Illuminating Co's Marketing Group sat down one summer day in 1954 to determine the most effective way to publicize and dramatize the vast growth potential it was believed the St. Lawrence Seaway could offer plants locating in northeast Ohio.

Primarily wanted was a medium that would tell the story to all of the men now having influence on plant location decisions. That meant a medium well suited to the group approach.

It would also have to have considerable range—for CEI's area is diverse and expansive. The St. Lawrence Seaway is also a massive subject—with countless economic and technical ramifications.

The medium would have to be able to integrate many heterogeneous aspects of the entire project. And most of all it would have to communicate drama that could impart much of the excitement that company executives felt about the Seaway.

After these considerations had been discussed, the list of possible media narrowed. Finally the selection was made. Only a motion picture could do the job.

Script is Written, Edited

The decision was reached in June, 1954. By early September, the story of the Seaway was on paper—a script by Frank Siedel of Storycraft, Inc, Cleveland. By the end of November, 16,600 ft of film had been taken—enough to make a motion picture seven hours long. The film was then edited to 4,000 carefully selected feet. That's enough for a full-length two-hour movie. This was finally cut to 1,008 ft, and CEI's Seaway story was in its final chapters.

Now here was a movie containing all the elements wanted—drama, color, a visionary approach, and solid facts and figures to reinforce the company's contention that Cleveland-Northeast Ohio is "the Best Location in the Nation" for industrial growth.

But a tool isn't worth a hoot unless you use it.

On Jan 3, 1954, the picture was presented to the press and a select group of civic officials and industrial executives in Cleveland's Music Hall. Over 2,000 people attended.

A month later, "Land of Promise" had its first showing in New York City. CEI personnel checked in for a two-day stay at the Waldorf-Astoria, set up equipment, and invited the top names of business and industry to drop by at their leisure. Showings were continuous.

During those two days, representatives of 73 companies saw "Land of Promise," and CEI area development representatives secured "leads" for new industrial construction in the Cleveland area estimated at $250-million.

From there, the show moved to St. Louis, Detroit, Chicago, Cincinnati, Boston, and finally to Los Angeles, and San Francisco. As the hotel bookings continued, a string of dates was confirmed for special showings in growth firms throughout the country.

Local Groups See Film

And just to make sure that every base was touched, the film was presented locally for civic groups and service organizations. It was also shown by all three Cleveland television stations. One station even used it twice. All gave it air time "in the public interest."

The ABC network scheduled the picture for their entire audience.

The TV audience totaled over 20 million people. In private showings across the nation, over 7,000 business executives from 600 companies accepted invitations to see the film.

From these showings, CEI picked up "leads" for another $250-million worth of new plant construction. This—added to the results of the New York showing—brought a total return from the "Land of Promise" to a rousing half billion dollars worth of "leads."

There can be no doubt that the film has been one of the most effective area development tools the company has ever produced, and yet one device has not done the job alone.

Direct mail created interest in the film, brought requests to see it. Space advertising sustained the interest, brought more requests. And company development people did an excellent job of using the film as a lead-in to specific subjects of interest to our company.

INTEGRATING all elements in "Land of Promise" promotion are CEI's (r to l) R. C. Hienton, marketing chief; R. W. Wyman; R. H. Bridges; and R. L. DeChant

Other Promotion Tools Cited

In short, it takes a complete program—ads, direct mail, visual aids, an alert staff of contact people—to make a major project work. Certainly no single sales promotional tool, no matter how costly or skillfully done, can do the job alone.

Even "Land of Promise" is only part of a bigger program.

We have already produced two follow-up films have already been produced. One picture is directed at the steel and aluminum industries, the other at the chemical industry.

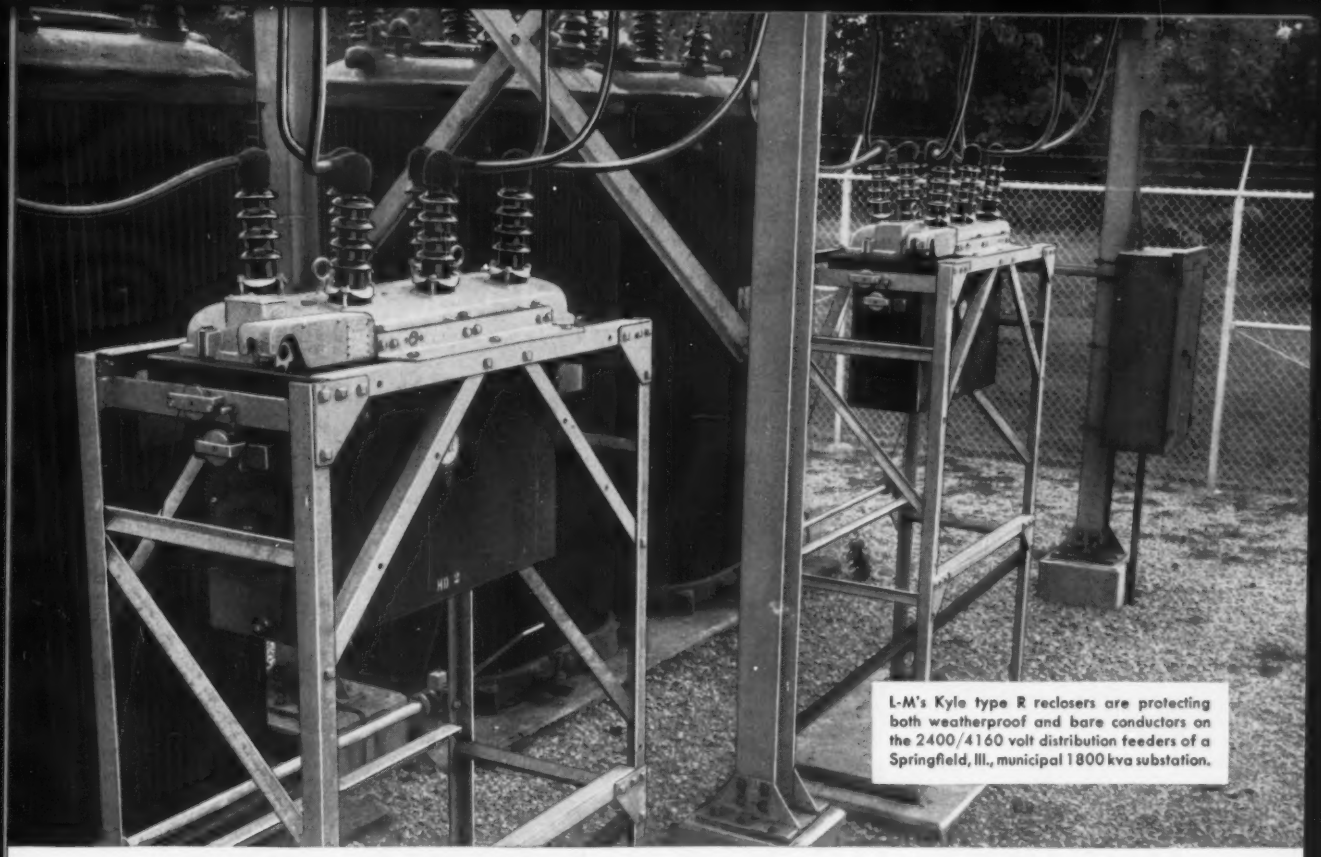
And these films fit into a still broader picture. They will provide more leads, which CEI will follow up with market research analyses and other data tailored specifically to individual company requirements.

In one to eight years, the results of these many forms of promotion and selling may pay off with a big new plant for the area. And that will enable CEI to increase substantially its power revenues.

It's a long, challenging sales process. But the rewards are not only in new business for the Illuminating Co. There are emotional satisfactions—the kind that come when you make a big sale, the kind that come from knowing you have contributed importantly to a good company's growth.

But it takes a fully integrated program, and lots of work, to realize those rewards.

We've found they're worth it.



L-M's Kyle type R reclosers are protecting both weatherproof and bare conductors on the 2400/4160 volt distribution feeders of a Springfield, Ill., municipal 1800 kva substation.

Improve Service Continuity . . .

High-Speed Kyle Type R Reclosers Reduce Conductor Burn-Down

by **FRANK McSTAY**
Product Manager
Kyle Products
Line Material Company

The operating speeds of conventional circuit breakers in many cases do not interrupt transient faults fast enough to prevent burn-down of weather-proof conductors or loss of mechanical strength of bare conductors. For this reason, Line Material Company engineers have designed fault-protective devices with extremely fast opening characteristics that will *minimize permanent system faults* resulting from transient or non-persistent causes.

Reduce Damage Caused By Transient Faults

L-M Kyle reclosers are completely automatic and self-contained. They provide high-speed circuit clearing (2-cycle maximum). Up to 90% of transient or non-persistent faults can be cleared by Kyle reclosers with no significant damage to the system or interruption of service continuity.

Ratings from 25 to 400 Amps.

The Kyle type R heavy-duty three-phase oil circuit recloser, shown above, is designed to replace breakers in substations with up to 100,000 kva fault capacity. They are available in normal load ratings from 25 to 400 amperes, with symmetrical RMS interrupting rating up to 6000 amperes at 4.8 kv and below and 4000 amperes up to 14.4 kv.

Almost any supplementary relaying scheme is adaptable to the type R recloser for substation application. Units are available with ground tripping, shunt tripping, shunt lockout, and auxiliary switches for remote control indication or low-voltage control switching.

Kyle Type R 3-Phase Reclosers available in normal load ratings FROM 25 TO 400 AMPERES

Ratings Amps.	Min. Trip Amps.	Inter. Ratings RMS Amperes 4.8 kv	14.4 kv
25	50	1500	1500
35	70	2100	2100
50	100	3000	3000
70	140	4200	4000
100	200	6000	4000
140	280	6000	4000
160	320	6000	4000
185	370	6000	4000
225	450	6000	4000
280	560	6000	4000
400	800	6000	4000

Get the Whole Story On L-M's Kyle Reclosers and Sectionalizers

Ask your L-M Field Engineer for information and bulletins on Kyle apparatus and complete coordination—single and three-phase—from substation to load. Or write Line Material Company, Milwaukee 1, Wisconsin. In Canada: Canadian Line Materials, Ltd., Toronto, Ontario.

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LINE MATERIAL Kyle® Reclosers

A McGRAW ELECTRIC COMPANY DIVISION

Take Advantage of Reclosers For Complete Automatic Protection . . .

YOU CAN SAVE

OVER A 5 YEAR PERIOD!

Multiply These Figures By The Number Of Feeders on Your System

Read the article from Electrical World on the opposite page. See how Colorado Central Power Company justified the application of reclosers and sectionalizers. Then multiply these figures by the number of feeders on your system and see how you can save thousands of dollars with reclosers for automatic protection.

Reclosers provide high-speed circuit clearing of faults, then automatically reclose and reset if the fault is transient or non-persistent. If the fault is permanent, the recloser will automatically segregate the faulted tap from the rest of the feeder.

Transient faults are caused by lightning, arrester flashover, or conductors whipping together on long spans. This results in fuse blowing but not necessarily in any noticeable line damage. A trouble man could spend hours looking for a burndown or equipment failure, drive hundreds of miles patrolling the lines—and find nothing.

With reclosers, up to 90% of these transient faults can be cleared, with no significant damage to the system or interruption of service continuity. Ask your L-M Field Engineer for more information on complete automatic protection—single- and three-phase—from substation to load. Or write Line Material Company, Milwaukee 1, Wisconsin. In Canada: Canadian Line Materials, Ltd., Toronto 13, Ont.

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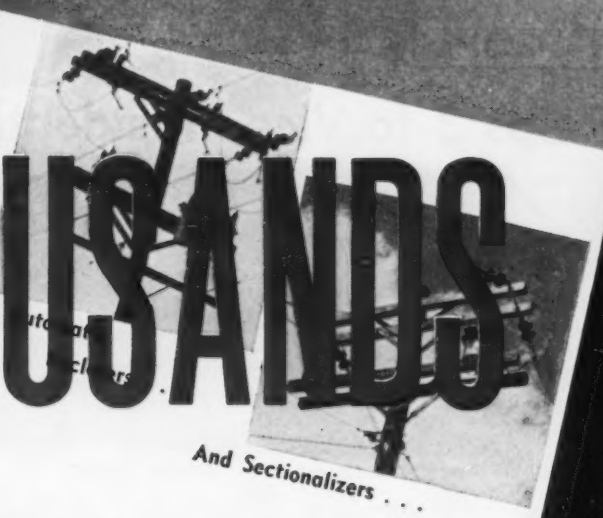
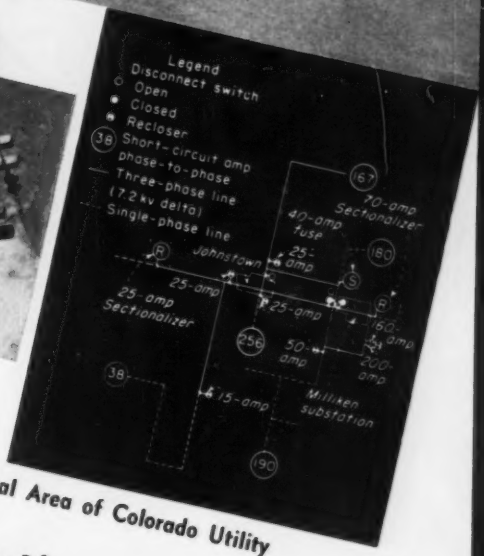
LINE MATERIAL Kyle® Reclosers

A McGRAW ELECTRIC COMPANY DIVISION

THOUSANDS



And Sectionalizers . . .



For Rural Area of Colorado Utility

DISTRIBUTION—Design

Prove Automatic Protection Justified

HOWARD S. SMITH, Distribution Engineer, Colorado Central Power Co, Englewood, Colo.

Protection of rural circuits with reclosers and sectionalizers may be justified on an economic basis for circuits having a low energy consumption where transient fuse-blowing requires many man-hours for service restoration. In applying an analysis to 7 and 13-kv rural lines, Colorado Central Power Co finds the key factor is the time spent in restoring service on lines protected with fuses and manual sectionalizing switches.

To determine how much money can be justified for automatic protective devices, this analysis may be used:

1. From field outage reports, separate transient and permanent line outages over a two or three-year period and tabulate as an annual average.

2. Determine man and truck-hours cost for a two or three-year period and tabulate as an annual average.

3. Estimate revenue losses because of outages over a two or three-year period and tabulate as an annual average.

4. If permanent faults are predominant in one area, which has a small load and can be properly sectionalized, the losses in revenue because of improper sectionalizing plus the cost of crew patrolling time should be tabulated on an annual basis.

5. All other costs which can be reduced by reasonable sectionalizing should be tabulated on an annual basis.

6. Evaluation of customer good will, which must be considered, cannot be reduced to a dollar value. However, continuity of service will be a deciding factor if rural load is to continue to increase. The increased revenue based on this intangible factor of good will should more than account for the maintenance of protective devices. It also will allow a margin of economic gain in favor of reclosing devices.

Add the annual costs as determined in items 2-5 and multiply by six. This figure is the amount of money that can be spent for protective devices for the area considered. This calculation assumes an average fixed annual charge of 16⅔% on the investment in protective devices. It also assumes that the economic point of investment is reached when the total cost of outages per year is equal to the fixed annual charge on the investment to reduce outages.

An analysis of the Milliken substation area of Colorado Central Power, shown in the diagram, will illustrate use of this method of calculation. Cost of transient and permanent faults, the total amount justified for automatic protection, and the cost of this protection are listed in the table. Note that the allowable economic investment is \$1,030 more than the economic figure. Thus the protective scheme is economically sound. Future fault data may justify replacing the fuses to the north of Milliken with reclosers.

Analysis of Economic Automatic Protection

Date from field outage reports:		
1. Transient outages, 18 per year		
80 man-hr @ \$5/hr	\$400	
50 truck-hr @ \$1/hr	50	
3,000 kwhr lost @ \$.02/kwhr	60	
Cost of fuse links	10	
		\$520
2. Permanent faults, 3 per year		
4 man-hr lost due to improper sectionalizing @ \$5/hr	\$20	
2,000 kwhr lost due to improper sectionalizing @ \$.02/kwhr	40	
		\$60
3. Total probable outage cost		\$ 580
4. Allowable economic investment (\$580 x 6)		\$3,480
5. Estimated installed cost of protective equipment*		
11 reclosers @ \$190 each	\$2,090	
4 sectionalizers @ \$90 each	360	
		\$2,450
6. Difference in favor of automatic protection		\$1,030

*Including installed cost of crossarms and hardware

Colorado PS Ups 3 to Vice Presidential Posts

Robert T. Person, Guy W. Thomas, and Paul A. Yetter have been elected new vice presidents of Public Service Co of Colorado.

ROBERT T. PERSON GUY W. THOMAS PAUL A. YETTER

As a vice president, Person will be responsible for the company's information, publicity, advertising, and employee education. He had been manager of advertising and publicity since 1953. Before appointment to this post he was vice president and general manager of Pueblo (Colo.) Gas & Fuel Co, a Public Service Co subsidiary.

Thomas, previously general commercial manager, will assume responsibility for all the company's commercial activities. After joining Public Service in 1919 as a junior engineer, Thomas spent several years as new business and power sales representative. His posts since then have included power sales engineer, power sales supervisor, and manager of the Denver commercial department.

Yetter, manager of the company's division operation throughout Colorado, joined the firm in 1923 in the electrical engineering department. He became division manager at Grand Junction in 1947 and division operations manager in 1953.

Okonite Advances Lapsley to VP

Newly appointed vice president of Okonite Co is Rhea P. Lapsley. As vice president of research and product development, his responsibilities will include both the Okonite research laboratories and the proving ground.

An electrical engineering graduate of Alabama Polytechnic Institute, Lapsley joined the firm in 1936 to open and manage the New Orleans sales office. After serving with the Corps of Engineers' South Atlantic Division as chief of the electrical section during World War II, Lapsley returned to Okonite as assistant chief engineer. Five years later he again joined the sales organization and, until his new appointment, was sales manager, Wilkes-Barre Division.

Sylvania Ups Ellefson, Chapman, Pettegrew

Elections of Dr Bennett S. Ellefson, Arthur L. Chapman, and Marion E. Pettegrew as vice presidents have been announced by Sylvania Electric Products, Inc.

DR B. S. ELLEFSON ARTHUR L. CHAPMAN MARION E. PETTEGREW

Ellefson, technical director since 1954, becomes vice president of engineering and research. He joined the firm in 1937 as a research chemist, and served in various engineering capacities until his 1946 appointment as director of the Central Engineering Laboratories, New York.

Chapman, who will now direct manufacturing, has been a vice president since 1950. He was previously vice president-operations, Radio and Television Division. His former company posts include inspection supervisor, plant manager, and Radio and Television Division general manager.

Pettegrew, who assumes Chapman's former post, will serve as operating vice president in charge of the Radio and Television, Parts, and Tungsten and Chemical Divisions.

NOW

S&C positrol fuse links

provide complete protection for pole-top capacitor banks

S&C Positrol Fuse Links will give you adequate, economical protection of pole-mounted capacitor banks—even considering the more difficult fusing requirements of ungrounded wye-connected banks.

Available in a complete series of ratings, Positrol Fuse Links have a margin of safety to withstand overload conditions and short duration transient currents considerably above ratings. Unnecessary outages are eliminated, but fuse action is rapid and dependable in the event of a faulted capacitor.

And, since these fuse links employ the S&C magnesium borate "Arctrol" sleeve, interruption of low-current faults is faster, more effective, and less violent.

Information Bulletin 500 explains in detail "The Fusing of Pole-Mounted Capacitors." It provides application tables to facilitate the selection of the correct fuse links for every capacitor fusing problem. It should be added to the technical library of every distribution engineer.

Specialists in High-Voltage Circuit Interruption since 1910

Write for new Bulletin 500 which gives valuable information on capacitor bank fusing.

S&C ELECTRIC COMPANY

4421 RAVENSWOOD AVENUE • CHICAGO 40, ILLINOIS, U. S. A.

In Canada: S&C Electric Canada, Ltd., 8 Vansco Road, Toronto 14, Ontario

POWER FUSES • DISTRIBUTION CUTOUTS AND FUSE LINKS • LOAD INTERRUPTERS • METALCLAD SWITCHGEAR

Richter Goes to Washington

V. CRAIG RICHTER

V. Craig Richter, associate editor of Electrical World, has joined the McGraw-Hill News Bureau at Washington as correspondent for this magazine. His coverage will be supplemented as in the past by the bureau's 20-man staff.

As a member of EW's staff since 1954 and as an editor of "Utility Spotlight" for the previous two years, Richter is well acquainted with the electric utility industry and its problems. Previously he had worked for the Reuters News Agency in New York for six years. He entered journalism in 1936 in his native South Africa and in 1941 went to Washington with the South African Government Supply Mission. He is a graduate of the Columbia School of Journalism.

ELLIOTT G. WHITNEY

Green Mountain Power Names Chief Engineer

Green Mountain Power Corp has announced the appointment of Elliott G. Whitney as chief engineer, with headquarters at the utility's main offices in Montpelier, Vt.

Whitney comes to Green Mountain Power from the Brockton Edison Co, where he served five years as an engineer. Prior to that, he was an engineer with the Middleboro (Mass.) Gas & Electric Department. Whitney is a graduate of Northwestern University where he received his degree in electrical engineering in 1949.

PERSONAL BRIEFS

Ernest R. Hendrickson has been named by Commonwealth Edison Co to succeed **John F. Sullivan, Jr,** as manager of construction for Commonwealth and its Public Service Co Division.

Newly appointed Detroit Edison Co officers are **Everett E. Roll,** general accountant; **Ray J. Plourde,** assistant general accountant; and **Miss Esther Birnbaum,** assistant secretary. The general accountant post had previously been assumed by **Thomas E. Hurns,** vice president and secretary, along with his other responsibilities.

J. Russel Samuels, manager of the Hazleton district of United Gas Improvement Co's Luzerne Electric and Gas Division, has been elevated to Luzerne Division sales manager.

Al Tudor, Arizona Public Service Co public information manager, has been named to fill a new position with responsibility for the utility's advertising, sales promotion, publicity, publications, art and production, and special services functions. In other company changes **Sherman R. Payne** was named sales promotion and advertising manager to replace **Jackson Hoagland** who resigned recently; **Jack Swift** becomes publicity manager; and **Bill Hope** is new publications manager.

E. Gordon Tallman has joined British Columbia Power Commission as senior projects engineer.

Recent General Electric Co promotions include: **John S. MacDonald** from manager of manufacturing operations services to general manager of the distribution assemblies department, effective June 1; **Frank E. Stehlik** to general manager, low switchgear department, to succeed **R. H. Jones,** recently promoted to general manager, Air Conditioning Division; **Howard D. Kurt** to manager-product planning, distribution assemblies department; **Francis R. Vanlandingham** to manager-distribution development, weathertron department; **Andrew L. Lozak** to superintendent-manufacturing, gas turbine department; and **John B. Hinds** to specialist-planning and methods, foundry department, Elmira Foundry.

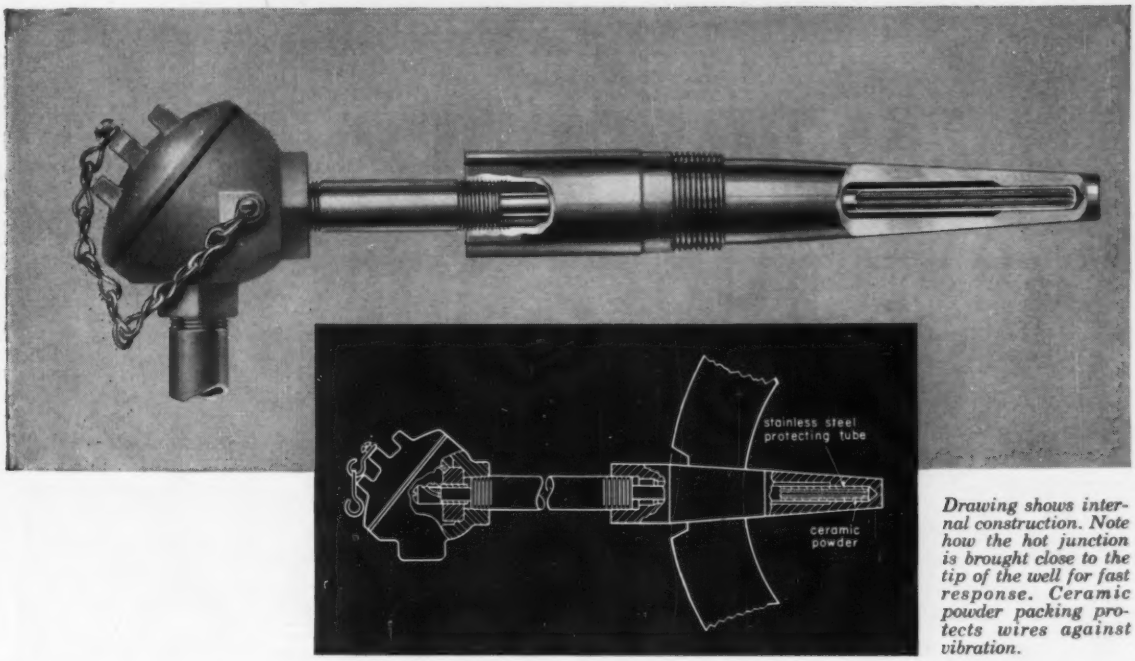
Westinghouse Electric Corp has designated **Clifford G. Patch** as assistant to the sales manager at its Sunnyvale (Calif.) plant. He is former general contract manager.

Philip S. Cannon has been named to the executive staff of Federal Pacific Electric Co as assistant to **T. M. Cole,** executive vice president.

New secretary of Thor Power Tool Co is **Frank J. Weitekamp,** also comptroller of the company and treasurer of the Thor Speedway Division. He succeeds **John A. McGuire,** recently named vice president.

Frank M. Viles, Jr, is new technical director of the Components Division of Federal Telephone & Radio Co, a division of International Telephone & Telegraph Corp. Viles is former administrative assistant to the general manager of Litton Industries.

National Bureau of Standards has appointed **Frank R. Caldwell** to head the combustion controls section of its Mechanics Division.



Drawing shows internal construction. Note how the hot junction is brought close to the tip of the well for fast response. Ceramic powder packing protects wires against vibration.

New Honeywell thermocouple for high-temperature, high-pressure steam

HERE'S a rugged, fast-acting thermocouple that is ideal for sensing temperatures in steam headers and feedwater lines. It's built to stand up under severe vibration . . . in the high temperatures, high velocities and high pressures of modern steam plants.

It is supplied in three styles . . . tapered and threaded, single-tapered for welding in a drilled hole, or double-tapered for pressure fit in a tapered hole. Designs are available for working pressures up to 5000 psig, temperatures to 1250 F., and velocity to 225 fps.

The thermocouple element is protected against vibration by an inert ceramic packing which holds wire in place inside a stainless steel tube. For high-speed response to temperature changes, the ends of the couple wires are fastened to the tip of this tube. The tube fits tightly into a drilled hole in the well... giving a short thermal path between the steam and the thermocouple. Thermocouples can be replaced without danger to personnel.

Either one or two thermocouples can be inserted in a single tube and well assembly, equipped with screw cover head. Either 15 AWG Type J or Type K thermocouples are used.

Your local Honeywell sales engineer will be glad to discuss how this new thermocouple can be applied in your plant. Call him today . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pa.—in Canada, Toronto 17, Ontario.

● **REFERENCE DATA: Write for Specification P58A, "New Honeywell Packed Thermocouple".**

MINNEAPOLIS **Honeywell**
BROWN INSTRUMENTS
First in Controls

If you're planning new bus bar construction for substations...

ASK YOURSELF THESE THREE QUESTIONS

1. ***In the face of continually rising copper prices, are you giving aluminum bus bar serious consideration for all your new substation construction?***

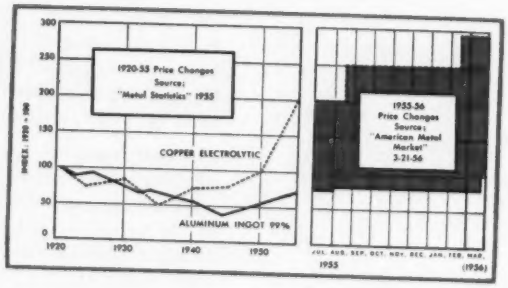
By specifying Kaiser Aluminum bus conductor, you *substantially* reduce your initial material cost. And you realize further savings during construction, because its light weight makes it far easier and faster to install.

2. ***Have you been watching how the price spread between copper and Kaiser Aluminum is continually widening?***

The box below shows the great and growing price advantage of Kaiser Aluminum over copper — and the advantage is likely to *grow even more* in the foreseeable future! This means you can plan far ahead to save money on your substation construction.

3. ***Do you know about the complete services available now to users of Kaiser Aluminum bus conductors?***

To help utilities take full advantage of the big savings offered by aluminum bus conductor over copper bus, Kaiser Aluminum will gladly provide technical assistance and field engineering service.



Kaiser Aluminum & Chemical Sales, Inc.
Industrial Service Division, Room 6591
1924 Broadway, Oakland 12, Calif.

Please send_____copies of your folder "Kaiser Aluminum Bus Conductor"

NAME_____

POSITION_____

COMPANY_____

ADDRESS_____

CITY_____ STATE_____

FOR more detailed information about Kaiser Aluminum bus conductors—rectangular bar, tubular, and solid round bar—send the coupon for a copy of our descriptive booklet. Contains additional advantages, data on types, and construction practices.

For immediate attention, contact any Kaiser Aluminum sales office. Kaiser Aluminum & Chemical Sales, Inc. *Executive Office*, Kaiser Bldg., Oakland 12, California; *General Sales Office*, Palmolive Bldg., Chicago 11, Illinois.

Kaiser Aluminum

MEETINGS CALENDAR

MAY

AMERICAN MANAGEMENT ASSOCIATION—General Management Conference, Hotel Roosevelt, New York City, May 23-25.

NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS—Annual Meeting, Ambassador Hotel, Atlantic City, N. J., May 23-26.

PENNSYLVANIA ELECTRIC ASSOCIATION—Systems Operations Committee, Bedford Springs Hotel, Bedford, Pa., May 24-25.

* **ARKANSAS POWER & LIGHT CO**—Dealer Coordination Committee, Southeastern Area Workshop, Arlington Hotel, Hot Springs, Ark., May 28-29.

CIGRE—16th Annual International Conference, Paris, France, May 30-June 9.

JUNE

ELECTRIC COMPANIES PUBLIC INFORMATION PROGRAM—Steering Committee, Traymore Hotel, Atlantic City, N. J., June 3.

EDISON ELECTRIC INSTITUTE—24th Annual Convention, Traymore Hotel, Atlantic City, June 4-6.

* **NATIONAL FIRE PROTECTION ASSOCIATION**—60th Annual Meeting, Statler Hotel, Boston, Mass., June 4-8.

NATIONAL ASSOCIATION OF ELECTRICAL DISTRIBUTORS—48th Annual Convention, Ambassador & Chelsea and Ritz Hotels, Atlantic City, N. J., June 10-14.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS—Semi-Annual Meeting, Statler Hotel, Cleveland, Ohio, June 17-21.

AMERICAN SOCIETY OF TESTING MATERIALS—59th Annual Meeting & 12th Apparatus Exhibit, Chalfonte-Haddon Hall, Atlantic City, N. J., June 17-22.

FIFTH WORLD POWER CONFERENCE—Vienna, Austria, June 17-23.

* **AMERICAN SOCIETY OF HEATING AND AIR-CONDITIONING ENGINEERS**—Semi-Annual Meeting, Washington, D. C., June 18-20.

CANADIAN ELECTRICAL ASSOCIATION—Annual Convention, Manoir Richelieu, Murray Bay, Quebec, June 18-20.

ELECTRICAL EQUIPMENT REPRESENTATIVES ASSOCIATION—Summer Meeting, La Playa Hotel, Carmel, Calif., June 20-23.

NORTHWEST ELECTRIC LIGHT & POWER ASSOCIATION—Accounting & Business Practice Section, Multnomah Hotel, Portland, Oregon, June 21-23.

PUBLIC UTILITIES ASSOCIATION OF THE VIRGINIAS—Accident Prevention Committee Conference, Hotel Roanoke, Roanoke, Va., June 22.

WISCONSIN UTILITIES ASSOCIATION—Accounting Section Convention, Schwartz Hotel, Elkhart Lake, Wis., June 24-26.

MICHIGAN ELECTRIC ASSOCIATION—Annual Convention, Grand Hotel, Mackinac Island, Mich., June 24-27.

ATOMIC INDUSTRIAL FORUM, INC—Conference sponsored jointly with Denver Research Institute, Denver, Colo., June 25-26.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—Summer and Pacific General Meetings, San Francisco, California, June 25-29.

AMERICAN SOCIETY FOR ENGINEERING EDUCATION—Annual Meeting, Iowa State College, Ames, Iowa, June 25-29.

AMERICAN CHIEF ENGINEERS' ASSOCIATION—Northwest Power Show, Minneapolis Auditorium, Minneapolis, Minn., June 28-July 1.

JULY

* **SOUTHEASTERN ELECTRIC EXCHANGE**—Personnel Administration Section, General Oglethorpe Hotel, Savannah, Ga., July 12-13.

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION—Council Meeting, Geneva, Switzerland, July 16-21.

NATIONAL ASSOCIATION OF RAILROAD AND UTILITIES COMMISSIONERS—Annual Convention, Sheraton Palace Hotel, San Francisco, Calif., July 24-27.

COLUMBIA UNIVERSITY INDUSTRIAL & MANAGEMENT ENGINEERING DEPARTMENT—Fifth Annual Utility Management Workshop, Arden House, Harriman, New York, July 29-Aug. 10.

AUGUST

WESTERN ELECTRONIC SHOW AND CONVENTION—Pan Pacific Auditorium and Ambassador Hotel, Los Angeles, California, Aug. 21-24.

SEPTEMBER

NORTHWEST PUBLIC POWER ASSOCIATION, INC—Accounting Section, Cascadian Hotel, Wenatchee, Wash., Sept. 11-14.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—3rd Annual Electrical Conference of the Petroleum Industry, Kansas City, Mo., Sept. 12-14.

* **EDISON ELECTRIC INSTITUTE**—Organization Meeting, sponsored jointly with AGA, Edgewater Beach Hotel, Chicago, Ill., Sept. 13-14; Industrial Relations Round Table Conference, Drake Hotel, Chicago, Ill., Sept. 17-19; Meter & Service Committee, Purdue University, Lafayette, Ind., Sept. 24-26.

PUBLIC UTILITIES ASSOCIATION OF THE VIRGINIAS—38th Annual Meeting, Greenbrier Hotel, White Sulphur Springs, W. Va., Sept. 14-15.

ILLUMINATING ENGINEERING SOCIETY—National Technical Conference, Hotel Statler, Boston, Mass., Sept. 17-21.

INSTRUMENT SOCIETY OF AMERICA—11th Annual Instrument-Automation Conference and Exhibit, New York Coliseum, Sept. 17-21.

ATOMIC INDUSTRIAL FORUM, INC—3rd Annual Forum Conference and 2nd Annual Trade Fair, Morrison Hotel and Navy Pier, Chicago, Ill., Sept. 24-28.

PENNSYLVANIA ELECTRIC ASSOCIATION—Annual Meeting, Hotel Wm. Penn, Pittsburgh, Pa., Sept. 25-26.

ELECTRIC COMPANIES PUBLIC INFORMATION PROGRAM—Steering Committee, Blackstone Hotel, Chicago, Ill., Sept. 26; Workshop Conference, Blackstone Hotel, Chicago, Ill., Sept. 26-28.

* Additions this week.

Engineering Surveys to Begin Soon for Nass River Development in BC

The Frobisher-Ventures group, through its subsidiary Northwest Power Industries, Ltd. has revealed that it will begin detailed engineering surveys of the Nass River in northern British Columbia to clear the way for a $50-million power development on the river sometime this month.

This has been confirmed by government spokesmen. It is first official word on the project since Premier Bennett announced towards the end of last year that Frobisher apparently was not proceeding with the $700-million power scheme originally planned for the Taku and Yukon rivers because of international power policy implications (EW, Jan. 23, p 119).

The company now is concentrating on the Nass as an alternative to its proposed project on the Taku and Yukon rivers. The Nass is not an international waterway.

While surveys on the Taku and Yukon project will continue this year also, priority is being given the smaller Nass development. It is anticipated the Nass project will be the first step in the long range plans to develop power in northwestern British Columbia.

RMEL Urged to Sell LBE Locally

Denver meeting hears proposal for 277/480-v underground residential system and also plan for a high-altitude, EHV experimental station

National advertising can create the desire, but only local selling can bring success to the Live Better . . . Electrically and Housepower campaigns. This statement sparked the spring conference of the Rocky Mountain Electrical League, Denver, April 29 to May 1.

On the engineering side, a 277/480-v system for residential underground was proposed, and plans for a high-altitude, extra-high voltage experimental station were described.

Someone must sell, said James T. Coatsworth, commercial director, EEI, if the goal of 2 million homes rewired in 1956 is to be reached. The desire for full housepower can be stimulated through national mass advertising and local promotions, but the local utility, electrical contractor, or dealer must complete the rewiring sale. Coatsworth urged "selling up to full housepower requirements".

Raise Budgets to Promote LBE

To be really aboard the Live Better . . . Electrically bandwagon, said R. E. Boian, General Electric Co, the local utility should hold regular LBE meetings with all interested groups. It should have regular joint promotional campaigns with distributors, retailers, and contractors. Electrical manufacturers should be urged to use LBE in advertising and sales aids. Boian said that local utilities should be ready to raise promotional budgets and make use of all advertising media.

E. W. Seay, Westinghouse Electric Corp, said that his company will tie in LBE and Housepower during telecasts of coming national political conventions.

Underground Distribution Worthwhile

Underground 277/480-v residential distribution offers cost advantages over the conventional underground system and should be considered for large, high-load density areas, said Howard Smith, Colorado Central Power Co. Cost of the higher voltage system includes a 10-kva dry-type transformer in each house in a 12-block area served from one substation.

Smith said also that industry groups should work through cities and counties to bring about legislation calling for 100-amp services for homes up to 1,600 sq ft and 200-amp services for larger homes. Roy Kennedy, Kennedy-Peterson Co, said the NECA has proposed a 100-amp minimum service entrance for Denver.

"We hope to find that a smaller conductor than is theoretically necessary can be used on future transmission lines over the Rockies," said L. M. Robertson, Public Service Co of Colorado. This is the goal of an experimental high-altitude, extra-high voltage station being built at Leadville, Colo. (EW, Aug 15, 1955, p 30). If present low-altitude practice followed, it would be necessary to use an ACSR conductor over 2 in. in diam or two 0.94-in. bundled conductors for voltages above 115 kv at 10,000 ft and higher.

Transformers with lower noise levels are in sight, said J. R. Mann, Allis-Chalmers Mfg Co. But transformers so quiet that noise need never be considered are unlikely for some time.

Automatic Scheduling Coming Soon

Discussing incremental system loading, J. L. McKinley, Public Service Co of Colorado, said there is a great need for a method that will replace necessary basic assumptions covering system power factor, line voltage, and rate of load variation. Because of the growing importance of incremental delivered costs, he predicted that completely automatic economic scheduling of generation will become standard in a few years.

Walter J. Plate, Anaconda Wire & Cable Co, remarked that present means of splicing and joining cables are adequate, but faster means must be found to hold down the cost. Some manufacturers, he said, are experimenting with field molding of splices.

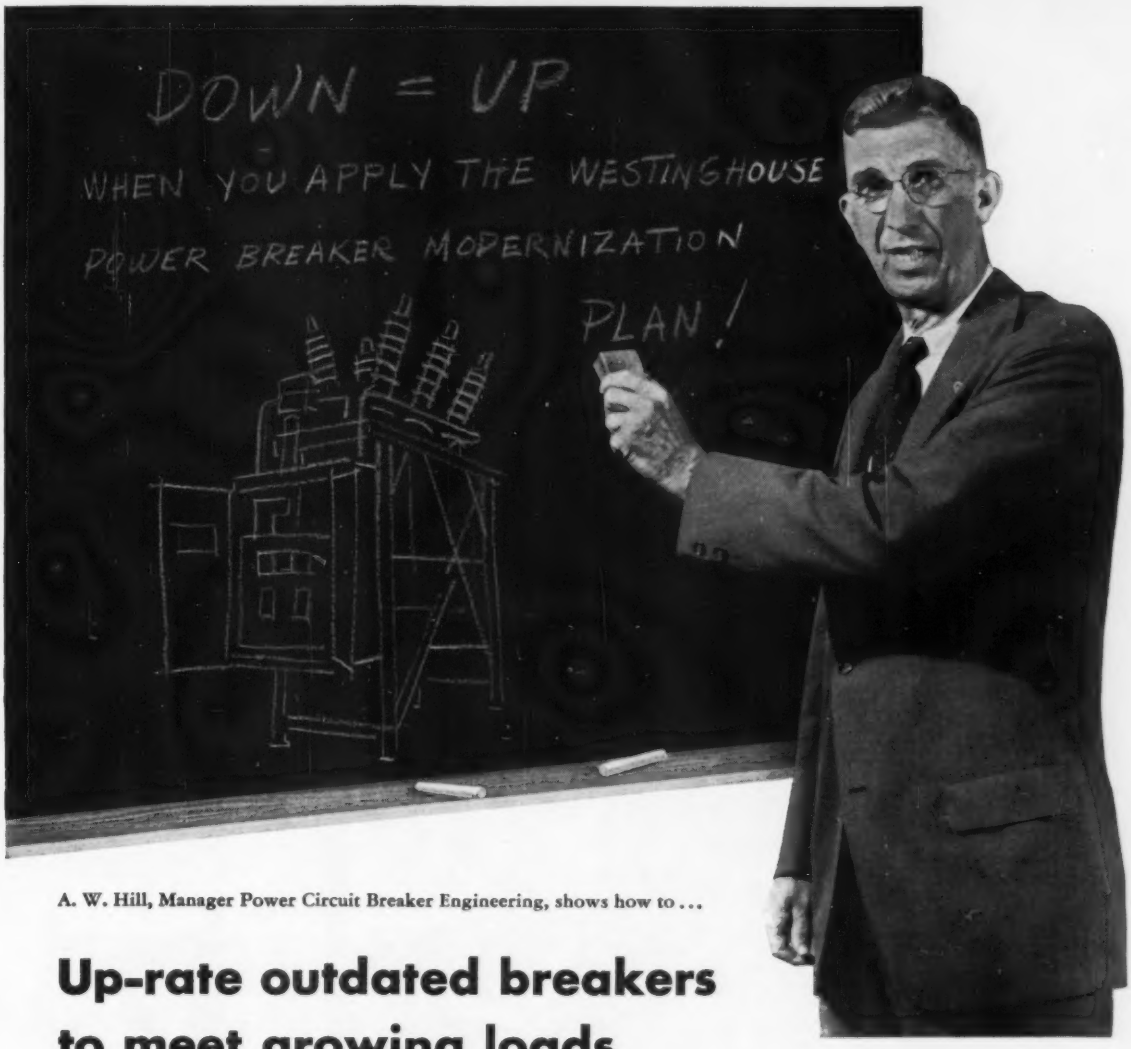
Southern Nevada Power Co, Las Vegas, will be first to use a microwave channel for phase comparison relaying. The channel will be between its new steam plant and two outlying switching stations, W. E. Sutter, General Electric Co, said. To eliminate the effects of multi-path cancelation in a microwave system crossing over San Francisco Bay, Pacific Gas & Electric Co will use two antennas at each end of a 55-mile leg.

High-voltage cables require so much surge energy to build up voltage that an analysis should be made of each installation, J. K. Howell, Westinghouse Electric Corp, said in discussing coordination or arrester characteristics with insulation BIL.

Denver Selling Rewiring Jobs

In the first four months of operation, the Electrical Modernization Bureau in Denver sold 34 rewiring jobs for a total of $8,140. The largest job, said A. A. Robke, Public Service Co of Colorado, was for $485, the smallest, $35. Sixteen jobs were financed through bank loans; the rest were on a cash basis.

Industry-wide "Dryer-a-Day" contests in Denver brought in 76,600 entries in 1954 and 29,900 in 1956, said Craig Ramsey of "The Denver Post." The 1956 contest required validation of an entry by an appliance dealer. These two contests helped to bring dryer saturation, gas and electric, in Denver from 5% in 1953 to about 20% in early 1956.



A. W. Hill, Manager Power Circuit Breaker Engineering, shows how to . . .

Up-rate outdated breakers to meet growing loads

There is not, in all probability, a single electric utility company in this country which does not find itself with breakers applied beyond their capabilities.

Westinghouse now offers you a simple Modernization Plan to up-rate inadequate breakers for as little as one-third the cost of new equipment. Interrupter and contact structures, which have been fully verified in the Westinghouse High Power Laboratory, replace the inadequate parts of an otherwise serviceable breaker. This relatively minor change increases breaker ratings 50 to 200% and adds years to the life of the breaker.

The plan saves you new breaker purchase and installation, and, in the bargain, eliminates the costly process of playing chess with your present breakers—replacing smaller sizes with larger ones throughout the systems. Save the expense of moving and reinstalling breakers, save the cost of larger foundations, save premium space.

Westinghouse O, G, GO and GM frame-mounted and floor-mounted breakers are covered by this plan. Contact your Westinghouse Sales Engineer for more information, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-60881

YOU CAN BE SURE...IF IT'S

Westinghouse

50
250

Moving in soon . . .

New transformers to increase return on your distribution investment

The most talked about news in distribution equipment investments are the new lines of Westinghouse CSP® and conventional transformers. In the CSP transformer, operating range has been boosted as much as 20% . . . without sacrifice of service life. In the conventional Type S, this increased capability is also available. These are head-and-shoulders advantages over any other transformers available today.

Returns to you can be enormous. Greater, longer overloads mean drastic reduction in line emergency calls. Planned change-out schedules can be met more easily.

For the CSP transformer, this means trip-outs—way down. Add to this a 15% boost in breaker settings for maintaining service in emergencies and you have operational flexibility—way up.

Now, imagine a transformer that predicts its own life. The new thermal-duty indicator* in Westinghouse Type S conventional transformers does just that. A signal light shows *when* the unit is overloaded; the indicator dial records *how long*, cumulatively for the life of the equipment. Again—for orderly checkups, change-outs and peak efficiency, this transformer has "economical buy" written all over it.

The result of these exclusive new developments is assistance to you in more effective load management. To meet the vastly increased demand for these new transformers, plants at Sharon, Pa., and Sunnyvale, California, are working around the clock.

Get in touch with your Westinghouse sales engineer or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-70763

* Optional at slight additional cost.

WATCH WESTINGHOUSE!

*WHERE **BIG** THINGS ARE HAPPENING FOR **YOU***

ADVERTISEMENT

Overhead Cables for Distribution

CURRENT TRENDS
One of a Series

Up until the last decade practically all overhead distribution involved some form of open-wire construction. Probably the most advantageous factor justifying this procedure has been economy plus an acceptable experience record. Like everything else, times are changing so that it is no longer axiomatic that open-wire circuits must continue to be used for overhead power distribution. Therefore, a brief story behind some of the modern cable designs for these applications may be of interest.

The need for cable is unquestioned. Overcrowded poles, severe tree conditions, storms, public relations, regulation problems and appearance are some of the contributing reasons for this need. The cable industry in recognition of this need has developed suitable cable products for almost every overhead distribution job and the Rome Cable Corporation has played a most active role in this progressive development. Cable costs have been so reduced by careful design and use of new materials that installed economies now closely approach open-wire construction in many instances. Today's distribution engineer would be remiss if he did not at least consider an appropriate type of cable for his new or replacement overhead distribution circuits. Rome Cable is prepared to supply all of these products and associated engineering services.

Primaries

There is a definite trend towards aerial cable in the 5 kv to 15 kv range but it is difficult to conclude whether this trend is more in factory-assembled or the field-assembled variety, since there are merits for each.

In the 5 kv range the cost of cable compared to open-wire construction may not be too attractive when evaluated on the installed cost per mile of line, averaging approximately twice as much. In the 15 kv range this picture improves somewhat. However, if this comparison is based upon final installed cost per KVA this differential between cable and open wire is considerably narrowed. Naturally, there must be other determining reasons for using cable, such as improved appearance, resistance to storms, less tree trimming, better voltage regulation and greater reliability.

Preference for cable design in the 5 kv rating utilizes ozone-resistant rubber insulation (such as Rome Cable RoZone) with a suitable nonmetallic sheath (such as Rome Cable RoPrene or RoSeal) . . . unshielded and relatively easy to hot tap, particularly when the cable incorporates the "reverse-lay" feature. Economic preference for cable designs for the higher primary voltages, utilizes the same grade of insulation on each conductor covered with a bronze tape which serves as a combined shield and armor but makes "hot tapping" difficult and hazardous. These and other cables may be supplied with insulated copper or aluminum power conductors all properly bound to the correct Copperweld messenger as described in the new IPCEA-NEMA specifications for aerial cable or an equivalent type. Installation procedures for factory-assembled or field-spun cables are described in the technical literature as well as manufacturers' catalogs.

Secondaries

Until quite recently there has been relatively little activity or interest in using cable for overhead secondaries but several utilities have been investigating and experimenting with either field- or factory-assembled cables for this application. Joint pole construction, elimination of crossarms, reduction of hardware, ease of installation, improved appearance, storm resistance, improved regulation and less tree trimming are some of the features to be realized, provided final installed cost is not prohibitive.

It is here that aluminum, at least for the phase conductors, seems to offer definite economic and technical advantages since the lighter weight is a most useful feature for line construction. With the advent of the now popular Triplex construction for service drops the idea of a similar factory-assembled cable for secondaries has certain merits. For single-phase secondaries, this cable generally consists of two insulated aluminum conductors (usually #1/0 or #2/0 AWG aluminum) spiralled around a suitable neutral messenger.

When this cable is used on conventional 150-foot pole spacings the service taps can be made at or near each pole with special fixtures now available. However, it is obvious that greater savings are possible with increased pole spacings and "flying" midspan service taps made where possible or convenient. Prefabricated devices to accomplish these taps have been developed. Thus, the combination of Triplex secondaries and services offer a new and advantageous construction idea at modest cost.

When secondary sizes larger than #2/0 AWG are required, either spinning or a cable construction similar to primary aerial cable is suggested.

Services

The use of open-wire service drops is rapidly disappearing particularly in new construction and housing developments. Service drop cable, Type SD, utilizing concentric neutral has been too costly to merit universal acceptance unless some special feature such as reduced theft possibility was desired. Nine years ago the Rome Cable Corporation introduced the now popular neutral or self-supported Triplex type of service drop cable. This design received almost instant acceptance and has proven highly satisfactory. The power conductors, insulated with polyethylene or Neoprene, are spiralled around a neutral messenger in accordance with IPCEA recommendations.

Aluminum unquestionably offers economic and technical advantages for the power conductors and has become the general choice of metal for this particular application. A popular neutral messenger has been a reduced size ACSR but the idea of hard-drawn copper has been gaining favor, particularly where there is planning towards Triplex secondaries with Copperweld messengers in order to provide copper-to-copper contacts on the exposed neutrals. Consideration of this "combination" design is suggested.

For further information on Triplex services or secondaries we suggest you obtain Rome Cable Bulletins RS-5 and MST-1.

Tree Wire

This discussion would not be complete without some reference to so-called Tree Wire installed on insulators for overhead construction. For primaries and unusually important secondary circuits this product would cost considerably less than insulated cable and somewhat more than weatherproof wire. Where extensive tree trimming is a problem or too costly the use of the newer low-cost special thermoplastic Tree Wire designs might be considered. Here, again, Rome Cable is ready with the information and the product.

ROME CABLE CORPORATION, Rome, New York

Wiring Promotion on a Shoestring

It doesn't always take big time budgets to get big time results. United Illuminating sunk only $20,000 into campaign that has sold 5,700 jobs

You're a small to medium-size electric utility. You don't have the budget to spend on "high, wide, and handsome" wiring campaigns that some others do. But like the larger ones you have house wiring problems that are hurting your business. How can you get big time results on relatively little money?

This is the problem that faced United Illuminating Co, New Haven, Conn., (185,00 meters) two years ago. With but $20,000 it set out to sell better wiring to the 122,000 homes it found through survey to be underwired.

"There was no national 'Housepower' program to help us then," says L. A. Dunn, merchandise manager. "Everything we did, we had to hatch up and do by ourselves."

They evidently had the right formula. Number of homes rewired jumped well above 100% in 1955 over 1954. Some 5,700 homes got new wiring at an average cost of $145.26 per dwelling unit. Gross rewiring business hit ¾ million dollars. It had its effect on appliances, too. Sales went up 25%, 63% of rewiring jobs were accompanied by purchase of one or more major appliances, 55% of customers who rewired said they would soon be buying more appliances.

Seven-Point Program

How UI went about getting these results is spelled out in its entry in Look Magazine's Adequate Wiring Awards competition (EW, March 12, p 52). Basically, it used these seven techniques:

1. Market survey.

2. Education of management, employees, and trade allies in advance of campaign.

3. Wiring finance plan.

4. Wiring contest for consumers.

5. Continuous promotion with extra emphasis on bill inserts.

6. Close liason with home builders and electrical inspectors.

7. A fulltime man to supervise the program.

And underlying it all was a strong program of customer contact.

UI began its campaign planning in the summer of 1954. After first determining the size of its rewiring market, it made still another survey—one to determine dealers' and contractors' attitudes toward company sponsorship of such a campaign. The results made it plain that a real selling job to these people was needed before the company could embark on any general consumer promotion.

Supervisor Named

A fulltime man, Kemp B. Batchelor, was appointed to head the program, and the job began in earnest. Dinner meetings were held for contractors and promotional materials were presented. Some 137 signed up and bought 20,000 estimate order sheets supplied by UI. Dealers were invited to early morning "Sales Clinic" breakfasts served by UI's home service girls. Newspaper and advertising men showed up too, with some good publicity the result.

"Throughout the meetings we bumped into the question of 'What's in it for me,'" says Dunn. "But there was a better response from contractors than we expected. Appliance dealers on the other hand presented another problem. They attended, but there was strong feeling among them that the contractor and utility get the lion's share of rewiring benefits. Now, however, after seeing appliance sales go up, they're becoming more aware of how good wiring helps."

From these key allies UI moved on to other groups such as distributors, inspectors, fire underwriters, and wiring device manufacturers. It got the local bankers to develop and promote a good wiring finance plan.

Employees were considered just as important in the planning. The employee magazine carried stories. Consolidated Edison Co's "Magic Link" film was shown. The employee credit union authorized rewiring loans up to $400. Home service girls were given a basic course in electricity. Even members of the distribution department were briefed on the program's plans and goals.

By the time the consumer campaign's opening day arrived (March 13, 1955) the needed trade help was pretty well solidified. "Not because of any allowances for wiring, or rebates, or cooperative advertising payments," says Dunn, "We don't believe in subsidies. But it came because we provided them with the materials for the job and helped them to do it."

Newspapers were the prime advertising media. Full-page ads in five dailies kicked it off followed up by smaller insertions on a 40-week schedule in five daily and seven weekly papers. A character known as "Mr. Overload" held together the central ad theme. Backing it up were radio, TV, window displays, and bill inserts.

Free Wiring Surveys

Its the bill inserts, in fact, which get a lot of the credit for the campaign's success. Printed on business reply cards, the inserts, mailed monthly, invite the customer to ask for a free survey of his home's wiring. Responses are followed up by a personal call from the company first, and then the "hot" ones are turned over to the contractors. "In the first nine months we had more than 1,000 cards returned which developed 596 screened leads for contractors," says Batchelor. "Cost, figuring cards, return postage, etc. came to $1 and a few odd cents per lead."

Not overlooking a bet to get mile-

SHOWMANSHIP: "Little Red House", built in 1790 had never been wired, gave UI great publicity beat

TRAINED EMPLOYEES: Homes service girls, given basic electrical course, took the story to customers

SOLID TRADE BACKING was lined up before program ever was unleashed. L. A. Dunn is below

How They Did It

UI made its $20,000 work hard with techniques like these . . .

A central promotional theme, solid trade backing, well-timed promotional devices and well-trained employees were UI's secrets. "Mr. Overload" keyed all ad messages (above left) while a wiring slogan contest (left) and Wiring Inspection Request Cards, mailed with monthly bills, culled out prospects.

age out of its money, UI went heavy for showmanship and customer participation devices. Most notable: A six-week wiring slogan contest and the wiring of "The Little Red House," a 165-year-old home that had never before had electric service. (see photos). Contest entrants picked up entry folders from participating appliance dealers, read the information, and then wrote a wiring slogan in ten words or less. It pulled over 2,000 entries, many of them supplying good advertising grist. Top prize was choice of home rewiring job or an electric range. One newspaper whipped together an eight-page section plugging the contest.

Another active field of wiring endeavor has been with the builders, architects, and inspectors headed up by Carl Priebe, UI's building sales specialist. Requirements for 100-amp service already have been put through in eight cities, and another one is expected to adopt it this summer. On the average 4.5 major appliances are going into each home built, and "more and more of 'em are all-electric".

UI at first estimated the job of upgrading its 122,000 underwired homes would take 40 years. Now, Dunn, Batchelor, and Priebe figure 20.

Their '56 program, headlined with the new "Housepower" theme, is being guided, says Dunn, by ten axioms:

1. The public is not afraid to talk about safety and fire hazards, why should we?

2. We have not sold contractors and dealers hard enough.

3. The return postcard will continue to play a prominent part in our promotion.

4. We will work to sell our Distribution Department and other employees that adequate wiring is worthwhile.

5. We will promote more actively with landlords and realtors.

6. We will bring the appliance dealers more into the picture.

7. We will take adequate wiring to the high schools and colleges.

8. We will improve our approach to builders of new homes.

9. We will work harder to improve electrical standards.

10. We will sell, sell, sell.

Other Wiring Sales Ideas That Worked

With Edison Electric Institute's "Housepower" promotion now getting into full force, more utilities than ever are looking for ways to put added punch into their own local campaigns. Taken from Look magazine's Adequate Wiring Award entries, here are examples of what other utilities, many of them veterans by now in the wiring promotion game, have done and are doing to delve into local markets.

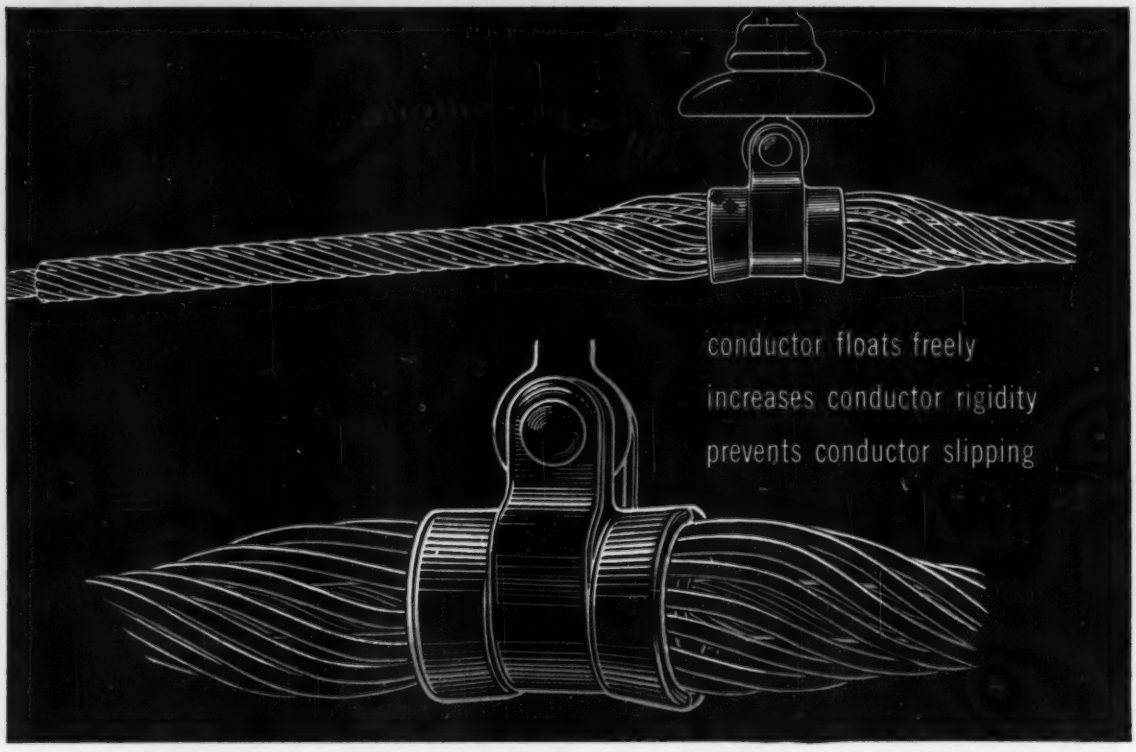
- Pacific Gas & Electric Co, through Northern California Electrical Bureau, awards special Service Entrance Wiring Certificates to homes which have 100-amp service switch and which make provision for future wiring expansion. Although this falls short of adequate wiring certification specifications, PG&E feels it helps sell 100-amp capacity where it is impossible to get complete house wiring.
- Some 11,000 homes, all certified for adequate wiring and all in a single housing development, will be added to Cincinnati Gas & Electric Co's lines.
- Indianapolis Power & Light Co pulled 2,000 entries in wiring modernization contest staged with city's annual home show. Contestants completed statement "I want to modernize electric wiring in my home because . . . " on entry blank clipped from IP&L newspaper ad or obtained at IP&L's home show booth.
- Northern States Power Co and North Central Electrical League have seen 100-amp ordinances adopted in Minneapolis-St. Paul, Sioux Falls, S. D., Eau Claire, Wis. and the state of North Dakota during past year.
- With installation of 5,240 new service entrances and 20,465 circuits and convenience outlets during first nine months of its "100-A" promotion, Philadelphia Electric Co figures it has unplugged the wiring bottleneck for sale of 4,100 new ranges, or 3,600 water heaters or dryers, or 3,600 dishwashers or 10,800 room coolers.
- Commonwealth Edison Co's "Share the Cost" plan (it pays for service entrance portion of wiring and shares cost of 100-amp entrance and 240-v circuits) drew 7,681 takers in 1955.
- Dayton Power & Light Co says 7,300 existing homes in its area changed from two-wire to three-wire service.

. . . Wiring Sells Homes in Houston

Houston Lighting & Power Co's results-getting approach for selling the builder (EW, June 27, 1955, p 168) is catching on faster than even the company had hoped. In the first year more than 200 builders signed up to put the company's "Reddy Wiring" in close to 1,500 homes. In return Houston L&P gives advertising and promotional help as at the 1955 Parade of Homes (above) where 72,000 persons streamed in to see 24 "Reddy Wired" homes (out of 30 on display). The company set up 5-ft signs out front, helped inside to pitch the all-electric kitchens and other electrical features. To rate a "Reddy Wiring" certificate a home must have, among other things, a 100-amp service entrance, range, washer, and dryer circuits, and plenty of 115-v convenience outlets. Houston L&P finds the builders mean it when they say good wiring helps sell houses. Headlines one of them in his newspaper advertising: "Does the Home You're Thinking of Buying Have 70 Electrical Outlets?"

. . . Contest Stirs Interest in Wisconsin

Better customer understanding of wiring needs is claimed by Wisconsin Electric Power Co after more than 25,000 entries were rung up in its "Bottle Neck Wiring" contest last fall. Here's how it worked: Company mailed out 430,000 folder-entry forms—one to each residential and farm customer. Contestant read the copy in the folder, answered a list of 20 questions, then completed 25-word statement, "Adequate wiring is a good investment for me because . . ." Some $4,000 worth of electrical merchandise prizes were awarded. Winners selected their prizes at dealers of their choice (above, a first prize winner receives new refrigerator and dryer). Wisconsin EP reimbursed the full price. For those "Housepower"-promoting utilities who are trying wiring contests for the first time, Wisconsin EP has words of cheer: "A substantial number of customers acquired a good knowledge of wiring through our contest—not only those who entered, but many thousands more who were exposed to the material."



an entirely new concept in suspension design

After five years of intensive laboratory research and field experience, Preformed Line Products Company announces the ARMOR-GRIP SUSPENSION. This is not just a modification of the conventional clamp—in fact, in a sense it is not a "clamp" at all. The ARMOR-GRIP SUSPENSION is a "floating suspension"—the conductor is cradled in neoprene and firmly gripped only by the custom-designed Preformed Armor Rods which distribute their pressure over a relatively large area. An ingenious relation between rods and housing prevents the suspension assembly from slipping longitudinally. The expanded configuration of the PLP rods also adds rigidity to the conductor while slight vertical resilience of the conductor mounting eliminates a steep stress gradient.

THE ARMOR-GRIP SUSPENSION ELIMINATES CONCENTRATED CLAMPING STRESSES.

In severe accelerated vibration tests, conductor mounted in the PLP ARMOR-GRIP SUSPENSION outlasts conventional clamp assemblies many times—in fact, no conductor failures have ever occurred under the ARMOR-GRIP SUSPENSIONS in these tests. Thousands of ARMOR-GRIP SUSPENSIONS have been installed during the past four years—with NO reported case of unsatisfactory performance.

Yet with all these functional advantages, the ARMOR-GRIP SUSPENSION is very easy to install. Simplicity of design has eliminated many parts—there are less than one-half the number contained in a conventional clamp assembly. Only one nut to tighten.

The ARMOR-GRIP is immediately available in conductor sizes in the ranges of 336,400 cm, 477,000 cm, 795,000 cm, 954,000 cm ACSR and All-Aluminum. Other sizes will soon be available and can be produced on request.

Made in accordance with or for use under one or more of the following U. S. Patents: 2,722,393; 2,275,019; 2,587,521; 2,609,653; 2,691,865; other patents pending.

PREFORMED LINE PRODUCTS COMPANY
5349 ST. CLAIR AVENUE • CLEVELAND 3, OHIO
TELEPHONE: CLEVELAND EXPRESS 1-3571

Fresh Slant Sells Safety

Appalachian's 'Basic Accident Control Plan' sparks interest with flannel-board displays

JOHN C. FRAZIER, District Safety Supervisor, Appalachian Electric Power Co, Charleston, W. Va.

Fresh approaches have to be used to sell safety. Without them, safety programs can too easily get on "dead center" instead of creating and maintaining desired action.

To help vary Appalachian Electric Power Co's main safety theme—removal of unsafe acts and conditions—flannel-board materials are used to keynote the company's program, "A Basic Accident Control Plan."

Developed in 1955, the 45-min program uses colorful cards, charts, and cartoons to attract and hold viewers' interest. It includes about 70 flannel-board illustrations integrating safety with all phases of company operation.

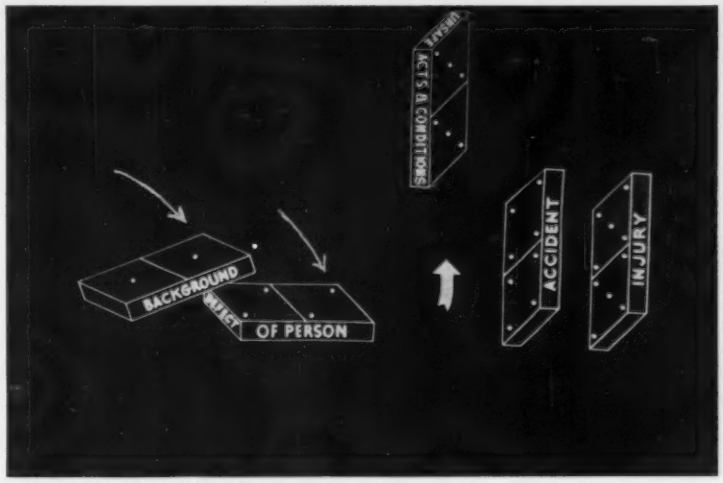
For example, the chain reaction of an accident's sequence, illustrated by the up-ended dominos, is the "Control Plan's" point of emphasis. And removal of the "unsafe act and condition" domino, representing the cause of 98% of all accidents and the one over which supervisors have greatest control, is the big step in breaking the sequence.

The "Control Plan" presentation has been made nearly 25 times throughout the Appalachian System and has been well received. About 1,100 employees and ten public organizations have seen and heard it. Compared to blackboard-on-easel, flannel board has these advantages:

- Permits step-by-step development of thought or trends with exhibits.
- Attracts and holds attention.
- Saves meeting time.
- Provides easy-to-see displays.
- Relieves pressure on speaker.

Flannel-board presentations, used extensively in Appalachian Co's parent American Gas & Electric System's employee information activities, has effectively developed and coordinated logical, step-by-step thinking and action in safety.

Aids for Safety Promotion . . .



. . . Help Break Chain-Reaction . . .

A BASIC ACCIDENT CONTROL PLAN
3 HELPFUL AND ESSENTIAL PROCEDURES
98%
UNSAFE ACTS & CONDITIONS
SAFETY OBSERVATION
OBJECT
UNSAFE ACT
CORRECTIVE ACTION
STOP
INSTRUCT
FOLLOW UP
ACTION
1. WORKING WITHOUT AUTHORITY
2. WORKING AT UNSAFE SPEED
3. MAKING SAFETY DEVICES INOPERATIVE
4. USING UNSAFE EQUIPMENT, HANDS INSTEAD OF EQUIPMENT, OR EQUIPMENT UNSAFELY
5. UNSAFE LOADING, PLACING, MIXING, ETC.
6. TAKING UNSAFE POSITION
7. WORKING ON MOVING OR DANGEROUS EQUIPMENT
8. DISTRACTING, TEASING, ABUSING, STARTLING, HORSEPLAY
9. FAILURE TO USE SAFE CLOTHING OR PERSONAL PROTECTIVE EQUIPMENT

. . . of Accidents' Main Causes

Super power transformers pace utility expansion

"Big Power" Transformer goes to Long Island

THIS 125,000-kva Allis-Chalmers power transformer is in operation at the Far Rockaway generating station of the Long Island Lighting Company. It is a typical example of the power transformers being built by Allis-Chalmers for utilities all over the country.

As power needs grow, utilities are adding more and more of these big transformers to their systems. Allis-Chalmers has helped in the development of new transformer engineering and construction techniques to aid utilities in solving their expansion problems.

Here are some of the features worth noting:

Quiet. This transformer was built to operate at 76 decibels. Normal sound level for a transformer of this type would be at least 85 db. Continuous noise research includes a 10-acre outdoor proving ground, mobile testing equipment, and extensive laboratory facilities for testing and analysis.

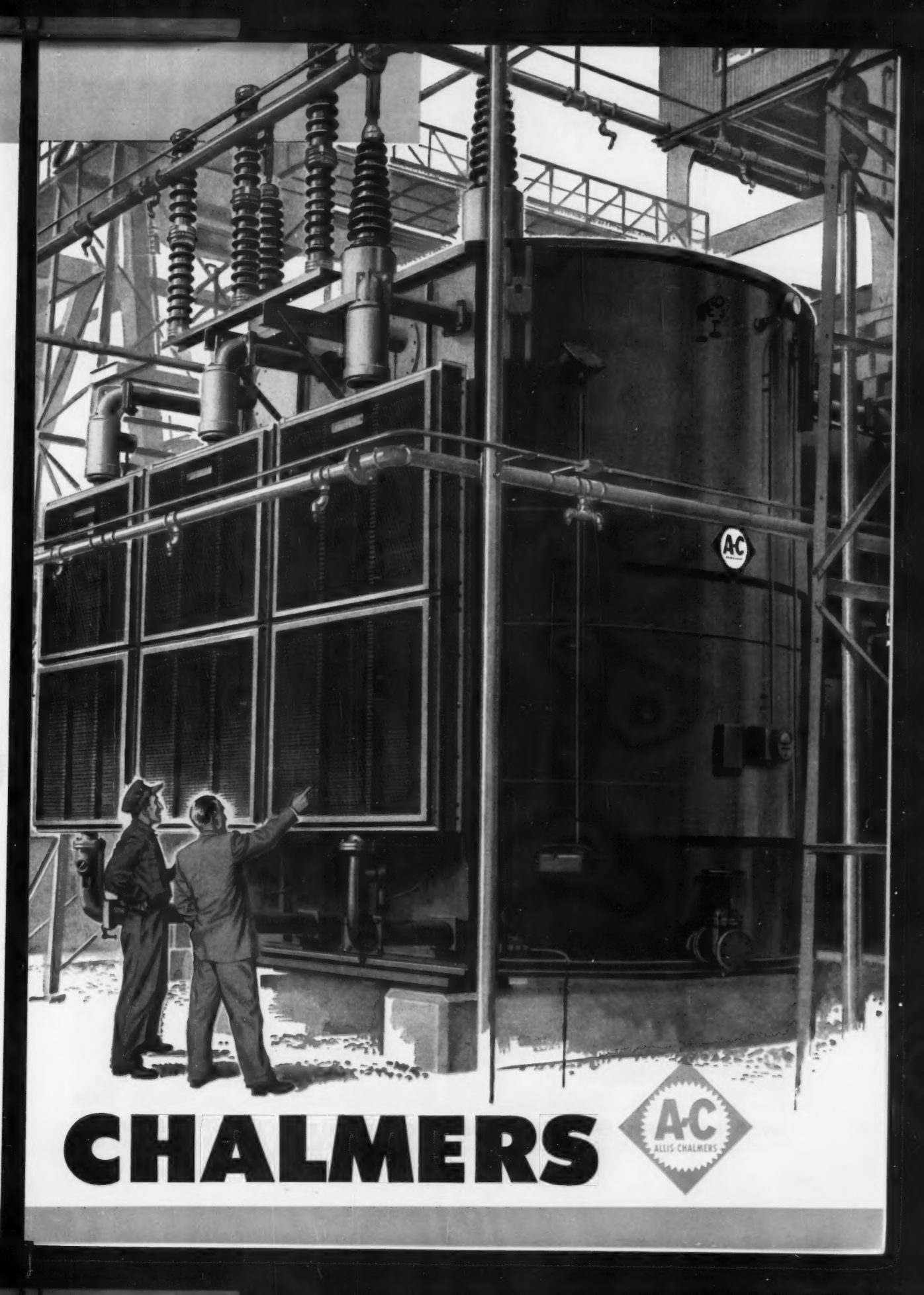
Cool. This transformer is cooled by *Electro-Coolers,* consisting of air-to-oil radiator-type heat exchanger and pump, which provide high efficiency heat transfer.

Corona-Free. Like all Allis-Chalmers power transformers, it is corona-free. Regardless of size or number of parts, the creeping deterioration of corona can never shorten the useful operating life of an Allis-Chalmers power transformer.

An Allis-Chalmers representative will be glad to discuss this or other power transformer developments with you at your convenience. Call the nearby A-C office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin. A-4913

NEW ERA
IN POWER
TRANSMISSSION

ALLIS-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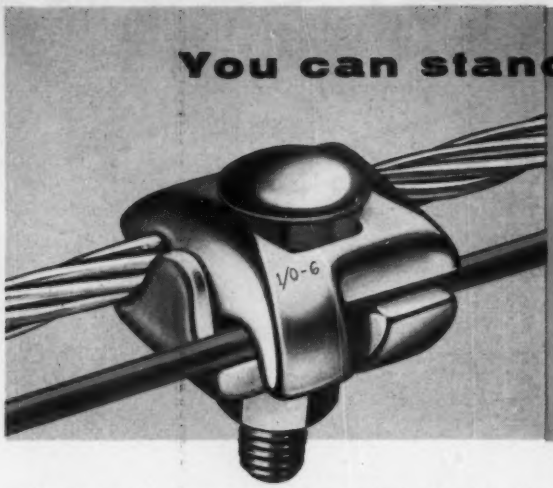


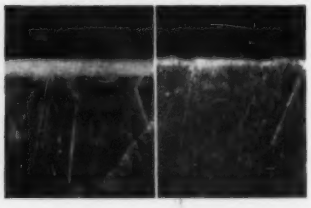
You can standardize on one

CHANCE AGP*
Parallel Groove Clamp
for all connections...

FORTIFIED CADMIUM...PROVED BEST BY TEST FOR JOINING ALUMINUM AND COPPER CONDUCTORS

"Your AGP connector, cadmium clad as you do it, is going to solve one of our greatest problems of making lasting A and C connections."—Power Company

"Your AGP clamps were subjected to approximately 500 hours in a humid sulphide atmosphere and after cleaning to remove the sulphide coating which had formed on the exterior, they showed no evidence of a breakdown of the fortified cadmium plating."—Eastern Utility



Micro-photograph shows how high-density FORTIFIED cadmium, applied to a thickness of .001" on Chance AGP Clamps, compares with commercial plating at right.

Aluminum to copper, copper to copper, copper to aluminum, or aluminum to aluminum

Connecting copper and aluminum conductor requires a general purpose connector as good as the conductor itself in conductivity, mechanical stability and corrosion resistance, if future trouble on the line is to be avoided.

The best conductor for this purpose is an aluminum bodied clamp with a properly applied coating of high density, fortified cadmium, proved best by every test for long-lasting, trouble-free, general purpose connections.

That's what you get in the Chance AGP Parallel Groove Clamp, companion to the widely tested and accepted Chance AGP Tap Clamp. You can standardize on one AGP clamp for any combination of aluminum or copper in a wide size range. Simplify stocking and eliminate the chance for error in installation.

*Aluminum General Purpose ... the All-Purpose Clamp That Needs NO COPPER INSERT

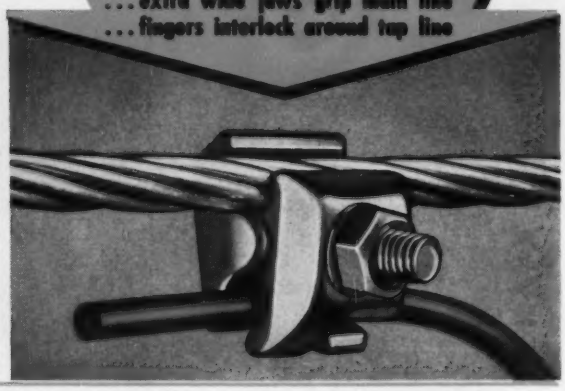
A. B. CHANCE COMPANY, Centralia, Missouri

Your choice of two designs

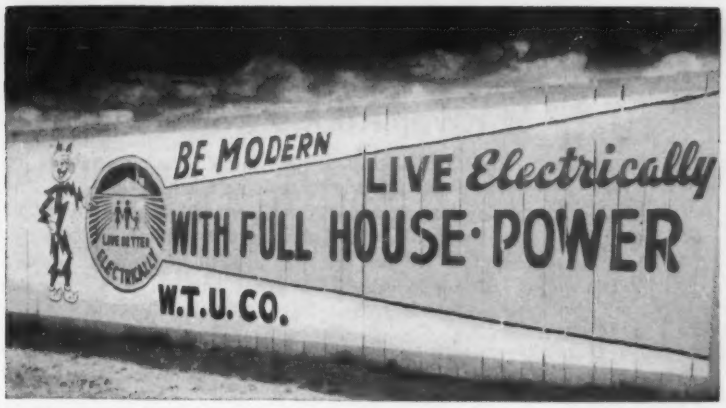
CC56-15

NEW PG 200 SERIES
...fingers interlock around main line and tap line

PG 100 SERIES
...extra wide jaws grip main line
...fingers interlock around tap line



In Aluminum General Purpose or Uncoated Aluminum



Using billboards in two-city campaign West Texas shows . . .

How to Wed LBE and Housepower

Nine West Texas Utilities Co men, fresh from a week-long refresher course on home lighting and wiring, began pushing doorbells and promoting "Live Better . . . Electrically with Full Housepower" early this month.

Small (103,000 customers), widely scattered (52,830 sq mi), the company has undertaken a gradual, economical marriage of LBE and Housepower programs. The extra, full-time manpower is spread thin (one man to 11,400 customers) but concentrates on the two big cities in West Texas territory.

"We thought we'd place major emphasis in Abilene and San Angelo," said Advertising Manager Robert E. Kennedy, where "we can effectively cover a large percentage (67%) of our total customers."

Following the LBE schedule of 200 other electric companies, West Texas started its tie-in with dealers, contractors, REA's, loan agencies, bankers, and realtors in mid-April with kinescope showings of the Feb. 8 LBE telecast in the two cities on consecutive days. F. W. Schroeder, executive vice president, outlined the "hows, whens," and "whys" of the program.

"Simultaneously . . . we launched, what is for us, an extensive radio and TV campaign . . ." Kennedy said, and scheduled billboard advertising like that above. "We close our spot announcements by inviting customers to contact the various members of our LBE team for assistance. Also, a series of TV and radio spots and newspaper ads offer free LBE consumer books."

"In both Abilene and San Angelo, West Texas has two men promoting these programs along with the related adequate wiring campaigns," Kennedy added. "Elsewhere, we have five other men working. They recently completed a refresher course based on Westinghouse Electric Corp's lighting and wiring text."

Washer and Dryer Sales Unlimited Says Maker

A future of "unlimited growth" for home laundries is the forecast of General Manager Ralph M. Spang, Hotpoint Co's home laundry department. He says by 1963 the industry will be selling more than 5-million automatic washers. And by 1965 dryer sales will hit 1.9-million units.

Spang backs his estimate by pointing out how home laundry products topped postwar growth of all major appliances. The industry sold 356,000 automatic washers in 1946, he says, and in 1955 sold 3,187,000. Dryer sales in 1947 totaled 38,000, while last year they soared to 1,085,000. In dollar volume for 1955 this meant $860 million in washers, $230 million for dryers.

Electric Heating Design Manual Ready for Sale

An electric heating design manual for use by utilities, dealers, contractors, and distributors has been released by the Electric House Heating Equipment Section of the National Elecrical Manufacturers Association.

It contains:

1. Recommendations on amount of insulation.
2. A standard method for computing heat loss.
3. Method of selecting proper heating equipment size.
4. A formula for estimating annual operating costs.

Instead of Btu method used in heating manuals for other fuels, this manual expresses heat content in terms of watts. Maps and tables allow calculations to be made for each area of the U. S.

Section Chairman Robert E. Pequignot says it is hoped the manual will become the industry's accepted installation guide for electric heating. Copies are available at 25¢ a copy from NEMA, 155 E. 44th St, New York 17, N. Y.

The section also is issuing an 18-min sound slide film, "Heat Your Home Electrically." Package includes the strip film, a 33 rpm record, and 100 consumer pamphlets. It sells for $15. Pamphlets may be ordered separately for $12.50 per 1,000. Order from Myron D. Miller, section secretary, at the NEMA address above.

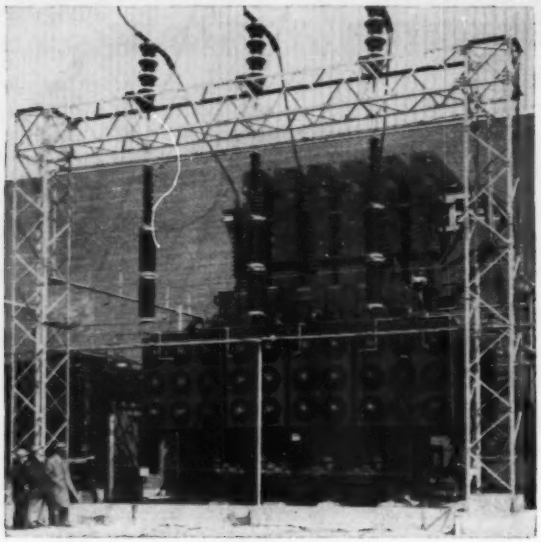
S&S SHORTS

What Lures the Shopper Back?

One-fourth of shoppers who come back for repeat purchases say a store's services for paying utility bills was one main reason. This was finding of new Batten, Barton, Durstine & Osborn, Inc, study.

Rural Research Council Formed

Minnesota co-ops, private power companies, and University of Minnesota have formed a Rural Electric Research Council to consider farmers' power needs and develop research.



Install 315 Mva Transformer at River Rouge Power Plant

This 315,000-kva, 17.3/129-kv transformer built by Westinghouse Electric Corp is installed at Detroit Edison Co's new River Rouge Power Plant. Reportedly the largest ever installed, the three-phase forced oil-to-air cooled transformer is the first of two identical units Westinghouse is building for the No. 1 and 2 generators. The second unit will be installed by late 1956.

The transformer was shipped upright in a one-piece tank, less bushings and cooling equipment. Its shipping weight was 325,000 lb and installed weight is 448,000 lb. The unit is about 24.5 ft high (from foundation to bushing tips), 16.66 ft wide, and 26 ft long.

Westinghouse is also constructing a 360,000-kva transformer for No. 3 generator.

3 Companies Hike Price of Fiber Conduit by 5%

Prices of fiber conduit were increased 5% recently by Line Material Co, Orangeburg Mfg Co, and Bermico Division of Brown Co.

• Line Material announced that increases in labor, material and freight charges made it necessary to institute a 5% price increase on its complete line of fiber conduit. The new price was effective May 3, L-M advised.

• Orangeburg Mfg disclosed that price increases of approximately 5% became effective May 8 on all sizes of fiber conduit. The hike does not apply to fittings.

• Bermico Division announced on May 5 a price boost of 5% on its bituminized fiber pipe. The price advance, following recent raw materials, labor and transportation increases, does not affect fittings.

Wheeler Celebrates 75th

The Wheeler Reflector Co is currently celebrating its 75th anniversary. John H. Lamothe, executive vice president and general manager, declared that the anniversary theme is "lighting the way to brighter tomorrows." The Boston firm is a major manufacturer of fluorescent and incandescent lighting equipment and street lighting fixtures. Plant is at Hanson, Mass.

Blackburn Building New Plant in St. Louis

Jasper Blackburn Corp of St. Louis, manufacturer of electrical fittings, has started construction of a new factory and office building in St. Louis (Mo.) County. The 100,000-sq ft brick and concrete building will be on a 10-acre tract at 1525 Woodson Rd.

R. N. Leach, executive vice president of Blackburn, said that they expect to be in their new quarters by May, 1957. Participating in the ground breaking ceremony were (left to right) R. E. Salveter, Woermann Construction Co; W. E. Wilton, Blackburn vice president; R. N. Leach; Kenneth Way, Blackburn sales manager; C. Nicholas and A. E. Fitch, architects.

(*More M&M on page* 59)

Wagner TRANSFORMERS...THE CHOICE OF LEADERS IN INDUSTRY

Where uninterrupted power is a must...

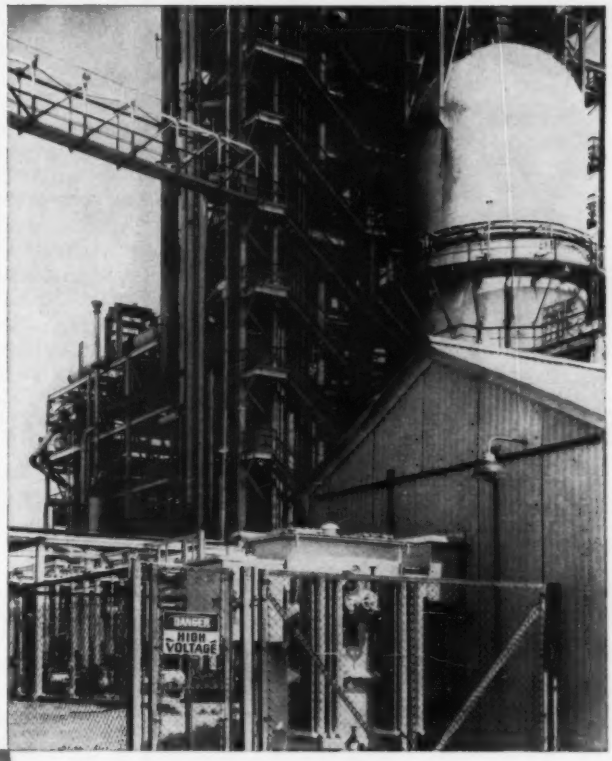
WAGNER UNIT SUBSTATION TRANSFORMERS

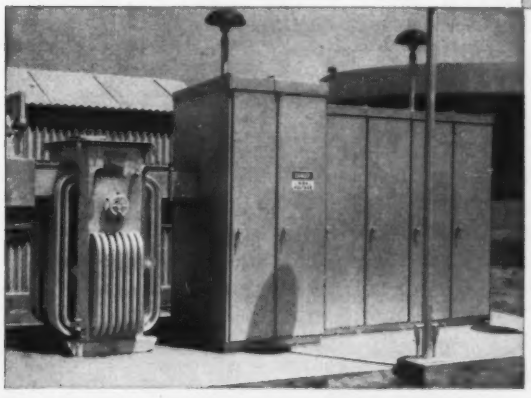
A completely dependable power supply is a vital necessity to an oil refinery. A power interruption of only a few minutes on a "cat cracker," like the one shown at the right, would completely disrupt this important processing operation and cause a shut-down of the entire refinery.

That's why you'll find Wagner Unit Substation Transformers at work at the Carter Oil Company refinery at Billings, Montana.

Wagner transformers are often found in installations where power supply failure would incur great loss because they have a reputation for complete dependability—backed by sixty-five years of transformer building experience.

Wagner Unit Substation Transformers, both liquid-filled and dry-type, are carefully designed to meet distribution requirements. Both liquid-filled and dry-type unit substation transformers are built in ratings through 2000 kva, 15 kv and below—you can choose the type and rating that exactly meets your load-center distribution requirements. Call the nearest of our 32 branch offices, or write us.





The 750 kva, 2400/4160Y to 480 volt, 60 cycle, three-phase, liquid-filled Wagner Unit Substation Transformer feeds the catalytic unit at The Carter Oil Company refinery. At left is shown a 225 kva Wagner substation transformer connected to an outdoor substation at the same refinery. Purchased and installed by The Fluor Corporation, Ltd., Engineers and Constructors for the Petroleum, Chemical and Power Industries, Los Angeles.

* * *

Write for Bulletins TU-205 and TU-214. They give full information on Wagner Unit Substation Transformers. Consult the nearest of our 32 branch offices about your next transformer installation.

Wagner Electric Corporation EST. WE 1891

...to help America LIVE BETTER—*Electrically*

LIVE BETTER ELECTRICALLY

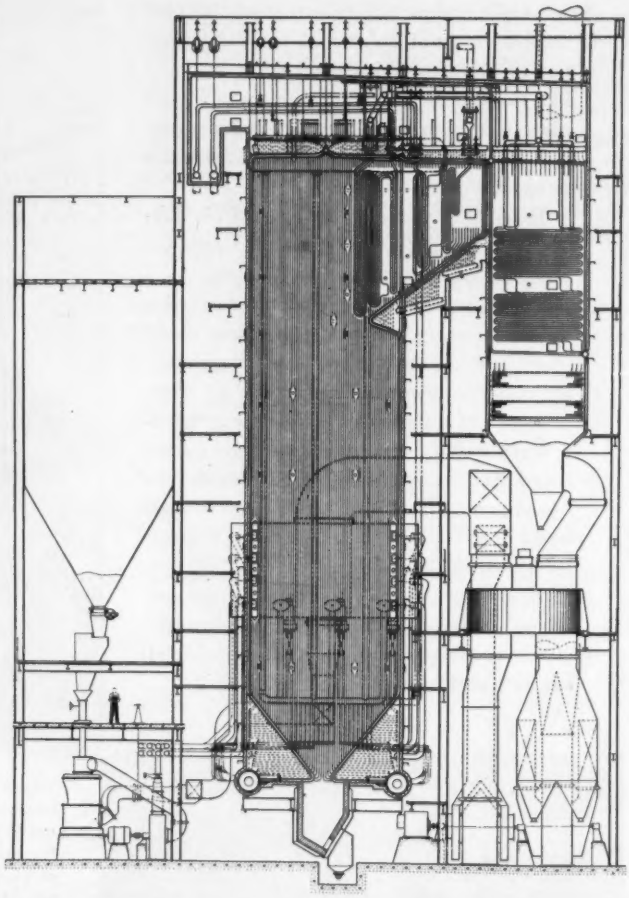
Wagner Electric Corporation
6456 Plymouth Ave., St. Louis 14, Mo., U.S.A.

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

TECUMSEH STATION

The Kansas Power and Light Company

C-E controlled circulation boilers



The C-E Unit shown here is now being fabricated in the shop for the Tecumseh Station of The Kansas Power and Light Company at Tecumseh, Kansas. Black & Veatch are the consulting engineers.

It is designed to serve a 90,000 kw turbine-generator operating at a throttle pressure of 1800 psig with a primary steam temperature of 1005 F, reheated to 1005 F.

The unit is of the controlled-circulation, radiant type with a reheater section located between the primary and secondary superheater surfaces. An economizer section is located below the rear superheater section and regenerative type air heaters follow the economizer surface.

Pulverized coal firing is employed, using bowl mills and tilting, tangential burners. Provision is made for the use of oil and/or natural gas as alternative fuels. B-931

C-E

COMBUSTION ENGINEERING, INC.

Combustion Engineering Building
200 Madison Avenue, New York 16, N. Y.

STEAM GENERATING UNITS; NUCLEAR REACTORS; PAPER MILL EQUIPMENT; PULVERIZERS; FLASH DRYING SYSTEMS; PRESSURE VESSELS; HOME HEATING AND COOLING UNITS; DOMESTIC WATER HEATERS; SOIL PIPE

Cadweld Splice Scores 100% in Utility's Tests

Tests to determine the degree of driving damage on ground rod splices made by the Cadweld process were conducted recently by Potomac Edison Co. The utility interpreted resulting data as showing that these connections were 100% satisfactory both electrically and mechanically. The test simulated the adverse rock shale soil condition in its service area.

For the tests, two 3-ft sections of rod were spliced by the Cadweld process, and the resultant 6-ft rod was driven into a railroad crosstie (see illustration). The tie was mounted vertically and the driving done in the normal vertical position. An 80-lb air "concrete buster" was needed to do the job. After driving the rod 5 ft, it was removed and the Cadweld connection was found to be unaffected.

The Cadweld process is a thermit method of welding copper to copper or steel developed by Erico Products, Inc., Cleveland. Conductors are butt-ended in the lower section of a graphite mold. Cadweld powder (copper oxide and aluminum) is then poured into the upper mold section. When ignited, the powder reacts and welds the conductors into a solid homogeneous copper connection.

NFPA Meeting June 4

National Fire Protection Association marks 60 years of fighting fires with engineering and education at its Boston meeting June 4.

'Super-Quiet' AC Motor Developed by Elliott Co

A "super-quiet" 2,500-hp, 2-pole induction motor has been developed by Elliott Co, Jeannette, Pa., for driving electric power station auxiliaries such as boiler-feed pumps.

This unit is reported to produce a quality and level of sound that is inoffensive to operators and neighbors of the installation. Two operators 5 ft from the motor can converse in their normal voices, the company said.

Following are some of the design developments of the new motor:

- Deep laminated core and deep transverse clamping, together with center and frame plates, to minimize the magnitude of double supply frequency vibrations transmitted from core to wrapper.
- Resilient mountings and shock absorbers to cut down vibrations transmitted to the foundation.
- Special baffles, bends and duct arrangements treated with sound-absorbing materials to reduce windage noise of the 720 and 3,000-cps tones.

GE's 2,500 Line Printer Can Speed Utility Billing

General Electric Co recently disclosed that it had developed a special-purpose high-speed printer capable of turning out more than 2,500 lines a minute. The principle of the printer can be applied to printing utility bills from digital computers, GE engineers said.

The electro-magnetic printer, about the size of a shoebox, has been used to print results of numerical calculations by fast analog computers, Robert D. McComb, GE engineer, said. "Lack of a satisfactory outscriber—the mechanism that writes out data from the computer—has been a limiting factor in the speed and efficiency of the computer," McComb observed.

Present-day tabulating machines operate at about 150 lines a minute, with some of the newest ranging as high as 900 lines a minute. The new model's speed may eventually hit "several hundred lines per second."

Instruments Division Voted By AIEE Directors

A sixth major technical division of the American Institute of Electrical Engineers, to be known as the Instrumentation Division, has been approved by the Board of Directors, advises N. S. Hibshman, Institute Secretary.

The new division, of which C. F. Savage, Jr., General Electric Co, New York, has been named chairman, will begin operations as a division August 1. At present it is part of the Science and Electronics Division, and is known as the Committee on Instruments and Measurements.

MANUFACTURERS' EARNINGS

COMPANY	PERIOD MONTHS	PERIOD ENDING	NET INCOME 1956	NET INCOME 1955	EARNINGS PER COMMON SHARE 1956	EARNINGS PER COMMON SHARE 1955
Allis-Chalmers Mfg	3	Mar. 31	$5,768,599	$5,920,165	$1.41(a)	$1.47(a)
Babcock & Wilcox	3	Mar. 31	3,609,000	3,648,000	0.70	0.71(c)
Buffalo Forge Co	3	Feb. 29	327,975	317,365	0.50	0.49
Corning Glass Works	12 wk	Mar. 25	5,084,540	5,206,446	0.75(a)	0.77(a)
Elliott Co	3	Mar. 31	490,944	68,260	0.78	....
General Electric	3	Mar. 31	54,962,000	52,516,000	0.63	0.61
Gulf Oil Corp	3	Mar. 31	69,319,000(n)	45,320,000	2.47	1.61(c)
Kennecott Copper	3	Mar. 31	44,135,744	28,972,987	4.08	2.68
Monsanto Chemical	3	Mar. 31	11,255,291	14,256,071	0.54	0.67(c)
Okonite Corp	3	Mar. 31	462,234	251,398	2.41(a)	1.40(a)
Republic Steel	3	Mar. 31	25,041,392	18,192,265	1.62	1.19
Reynolds Metals	3	Mar. 31	11,574,212	7,116,289	1.12	0.71(c)
Sangamo Electric	3	Mar. 31	759,481	566,048	0.95	0.71
Square D Co	3	Mar. 31	2,437,315	1,385,723(r)	1.44	0.82(c)
Texas Co	3	Mar. 31	69,958,343	56,021,212	2.58	2.04
U. S. Rubber	3	Mar. 31	9,103,348	9,940,276	1.44	1.63
Westinghouse Elec	3	Mar. 31	18,575,000(d)	12,782,000	....	0.75(a)

NOTES: (a) Based on shares outstanding at close of the period. (c) Based on shares now outstanding. (d) Net loss. (n) Includes estimated earnings of Warren Petroleum for March. (r) Adjusted to include Electric Controller & Mfg. Co, acquired by Square D late in 1955.

BUSINESS OUTLOOK

Electrical World
MAY 21, 1956

The failure of business to show any upturn this spring hasn't harmed the outlook one bit. For the middle and long term, business has never looked better. **That's the inescapable conclusion from the results of the new McGraw-Hill survey of Business Plans for New Plants and Equipment. Business has never before displayed such enthusiasm and such willingness to bet on the future**—in concrete terms. These plans don't guarantee prosperity, of course. But if they're carried out, they make good business overwhelmingly probable.

• • •

The survey shows business plans to spend this year almost $39 billion in new plants and equipment. This is nearly 30% higher than '55, which was, after all, considered a pretty wonderful year. Manufacturing alone is expected to top 1955 investment by over 45%. Mining investment is estimated to be up 34%, petroleum 11%, railroads 62%, public utilities 15%, and commercial enterprises 20%. These figures show that industry has substantially upped its expansion goals even since last October. **The present results reflect business thinking in April and early May,** late enough for business to be discouraged about the decline in auto and farm equipment sales, if it was going to get discouraged—which apparently it is **not.**

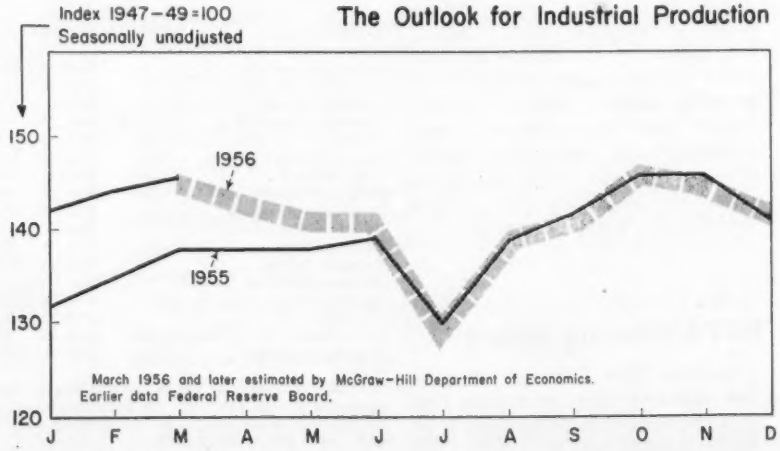
• • •

What's especially newsworthy is the extraordinarily high level of planned outlays for 1957 to 1959. In the past, plans for future years have always been lower than for the year in which the Survey is made, many companies being unable to visualize very concretely what their future capital requirements will be. This year the situation has changed notably. **Over 88% of the firms queried now have specific investment plans as far ahead as 1959. And these plans are big: 1957 is almost up to 1956, and 1958 and 1959 drop off only slightly.**

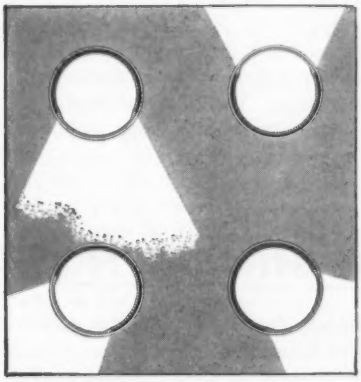
• • •

The Survey results also help us to understand **why** this surge of new investment is occurring. **Most industry in 1955 was operating close to 100% of capacity. The preferred operating rate is under 90%.** This year's planned investment would add 8% to manufacturing capacity and capacity would increase 26% by 1959. However, manufacturer's sales are expected to increase by 24%, so there'll still be little progress in getting down to the preferred operating rates.

The Outlook for Industrial Production



NEW Fluorescent Lamp *with Internal Reflector*



Single-pin-type lamps are extremely flexible! The lamp may be turned in any direction so that the light is directed where it is wanted.

THIS new Directional Reflector Fluorescent Lamp is the result of research on the part of Sylvania lamp engineers to give the public better lighting in industrial and commercial applications. An internal reflector coating, covering more than half the circumference of the tube, is applied between the glass and the standard fluorescent phosphor.

More relative light! The Sylvania Directional Reflector Fluorescent Lamp increases the relative light through the aperture by as much as 60 per cent brightness.

Under service installations where dust and dirt are present, this lamp will give the user a significant increase in more useful light. It is less affected by deposits of "light-stealing" dust and dirt on the top surface of the lamp.

Many advantages! Sylvania's Directional Reflector Fluorescent Lamp may be mounted without reflectors in installations with ceilings of poor reflectance. It will step up the light output of fixture reflectors that are deteriorated by age. It saves on lamp cleaning and maintenance costs, gives increased lumen hours in supermarkets and commercial establishments using bare single-pin fluorescent lamps.

The directional lamps in production are the 48-inch and 96-inch, cool white, single-pin sizes.

Our commercial engineering department will be glad to help you with your special application or installation problems. For complete technical data write directly to:

SYLVANIA ELECTRIC PRODUCTS INC.
Dept. 6L-2806—Lighting Division
60 Boston St., Salem, Mass.
In Canada: Sylvania Electric (Canada) Ltd.
University Tower Building, Montreal

SYLVANIA®

. . . the fastest growing name in sight

LIGHTING • RADIO • ELECTRONICS • TELEVISION • ATOMIC ENERGY

IN THE INDUSTRY

Where Is GOP Power Policy Headed?

Public power is still protected. Electric companies come off second best. Federal government continues its domination of hydro development

The future direction of Republican power policy can be charted fairly well from the record of the Eisenhower Administration during the past three years. From this record we may conclude:

- The privileges and prerogatives of public power groups and cooperatives will be protected and perhaps expanded.
- Electric companies will receive favorable consideration only when state or local public power groups fail to offer an acceptable solution.
- The federal government will continue to have a predominate voice in water-power development even though federal expenditures are reduced.
- The Administration will continue its attempts to put federal power marketing on a more realistic, more business-like basis.

This policy, needless to say, has been shaped by political considerations as well as Administration philosophy. If the present Administration had been able to start from scratch, the policy might have been very different. But in this case the Republicans took over after 20 years of Democratic reign.

An impressive series of actions illustrates the present trend of power policy. The Administration, through its Budget Bureau, has endorsed public development of additional power at Niagara Falls although New York electric companies stand ready to carry out the project. The Administration approved and signed legislation for development of Markham Ferry by the State of Oklahoma. President Eisenhower personally supports local public development of power features of the Cougar project in Oregon. The Administration cleared the way for Memphis to build a large generating station even though it meant reneging on a contract already signed with a privately owned company.

Preferred status of public groups and cooperatives in purchase of federally produced power has been strengthened by an Attorney General's opinion. This preference status was also fully recognized in contracts signed with electric companies in the Pacific Northwest and in marketing criteria for disposal of federal power in the Missouri Valley.

In contrast, electric companies have received a nod from the Administration in only two instances: one for hydropower development at Hells Canyon on the Snake River in Idaho, the other for the Coosa River project in Alabama. In case of Hells Canyon public power groups offered no alternative local plan. In the case of the Coosa project public or cooperative groups presented no effective opposition.

In all of these actions, the Administration retained a strong voice in the final decisions. By so doing it retained a strong role in power development while trimming the federal power budget from the $713 million proposed by the preceding Administration for fiscal 1955 to $308 million for fiscal 1957.

The Administration has made progress in putting federal power marketing on a more business-like basis. Most noticeable is its current drive to bring rates of Southwestern Power Administration in line with production costs. The Missouri Valley marketing criteria was also another step in the right direction.

TECHNICAL NOTES

Maintenance manhours per kw merit evaluation together with operating personnel requirements in designing a power plant.

Ability to burn dirty coal in modern boilers is not an unmixed blessing. Selecting coal suited to the boiler can cut downtime and save in handling cost, ash disposal, pulverizing, and use of soot blowers.

Blade wheel of a wind-driven power plant must be 33-ft diam to produce 5 kw in 18-21 mph wind.

Standard demand devices for electric metering appear in 5,000 different combinations.

Using an autotransformer with minimum tertiary can save 65% compared with a conventional Y-Y transformer where voltage ratio is near 1 : 1.

Transductors without self-excitation transform dc to proportionate ac for measurement. With self-excitation they act as amplifiers, controllers, or regulators.

State for Niagara Pushed

. . . on TV with film prepared by Senator Lehman to present points of his bill which seeks state agency development

Sen Herbert H. Lehman (D-N.Y.), went on television last week to air his views on the Niagara power legislation which the Senate was debating. He appeared in a 15-minute filmed interview with Washington Correspondents Lucien Warren of Buffalo (N. Y.) Courier-Express and Alan Emory of Watertown (N. Y.) Times.

Lehman's office has offered the film to 25 key TV stations in New York State. So far, the Columbia Broadcasting System network and stations in Albany, Binghamton, Rochester, Buffalo, Watertown, Syracuse, and Plattsburg have accepted copies.

The Niagara interview is one of a series of TV films and recorded radio talks the Senator makes available to New York stations. The TV films are not regularly scheduled and are produced to set forth Lehman's views on current issues. The recorded radio talks go out each month to 27 stations. Cost of the TV show, produced in the capitol's studios below commercial rates, is under $400. Senator Lehman, personally, bears the cost of the programs.

Following are excerpts from the televised Niagara interview:

Q—Senator, you are the primary sponsor of the Niagara power redevelopment bill. Can you tell us something about the provisions of your bill and about the other bill that was defeated in committee?

A—The bill which I introduced on behalf of myself, with the co-sponsorship of 16 of my colleagues in the Senate, provides for the construction and operation of electric power generating facilities on the Niagara River by the Power Authority of New York State. Congress, of course, must act on this bill before it can be fully operative because of a provision in the treaty . . . between the U. S. and Canada in 1950, which called for action by Congress. This development . . . would generate about 10-billion kwhr of electric energy . . . and would provide a yardstick for the electric rates in New York State.

Q—Suppose your bill becomes law . . . what do you feel would be the long-term effect on New York State consumers and on the private companies who are fighting your bill?

A—It would lead to a very substantially lower rate to the consumer . . . (and) . . . it's not even going to hurt the private utility companies. Of course, experience has taught us, in many areas of the country, that wherever rates were reduced through competition, the consumption has increased to such an extent that it benefited the private utility companies which after all today produce the major part of the energy that is consumed in the state and will continue to, under all circumstances. . . .

Q—You claim that a majority of the people in New York State support your bill and that . . . both parties have supported it in their platforms. But I'd like to have you account for the fact that 32 out of the 41 representatives from New York State in 1953 voted for the private bill. . . . Are you sure that you have the majority of support?

A—Oh, I haven't the slightest doubt of that. . . . So far as the opposition of the private utility companies—it's natural that private utility companies should oppose us. They have nothing to lose. They use the money of their consumers—which they can write off, of course, as an expense to make propaganda, and they have done it to the extent . . . of many millions of dollars over the years.

Q—On this popular support in New York, there have been a couple of suggestions . . . that in order to settle it once and for all, there should be a state referendum to determine whether a majority of the state favors it. What's your idea on that?

A—I know that Congressman Cole suggested this last year, and he may have suggested it again this year. It was supported, I think, as a device, I believe, for delaying consideration of passage of this bill. But when it came down to it, they didn't dare to bring it up in the state legislature. . . . They knew they would be licked.

World Power Conference

(*Continued from page* 10)

W. Kenneth Davis, director, Division of Reactor Development, Atomic Energy Commission.

- Economics of Nuclear Power—U. M. Staebler, chief, Civilian Power Reactors Branch, Division of Reactor Development, AEC.
- A 180 Megawatt Boiling Water Reactor Power Plant—T. G. LeClair, engineering assistant to the vice president, Commonwealth Edison Co.
- Status Report on the Pressurized Water Reactor (PWR) Plant—John W. Simpson, Atomic Power Division, Westinghouse Electric Corp.
- Considerations Involved in a First Nuclear-Electric Power Reactor in New England—R. Leigh Fitzgerald, assistant to the president, New England Electric System.
- Power Pool Operations—Howard L. Melvin, chief consulting engineer, Ebasco Services, Inc.

Utility officials serving as members of the executive board of the U. S. National Committee for WPC are R. G. Rincliffe, president of Philadelphia Electric Co, representing Association of Edison Illuminating Companies; and W. L. Cisler, president of Detroit Edison Co, representing Edison Electric Institute.

Capital Spending Slated

(*Continued from page* 9)

Development of new products is one of the key factors in industry's plans to increase sales. According to the McGraw-Hill survey, manufacturing companies, as a group, expect 11% of 1959 sales to be in products that were not made in 1955. The electrical machinery group expects 18% of sales in 1959 will be new products and, accordingly, electrical machinery manufacturers expect to spend 56% of their total 1956 capital outlay budget to make new products.

The machinery group expects to devote 75% of its 1956 capital expenditures to new products.

Another factor influencing capital outlay for expansion is the rate of operation. Most industries were operating at close to 100% of capacity at the end of 1955 but the preferred rating is under 90% in most industries. The operating rate generally should be improved since current plans call for an 8% increase in manufacturing capacity this year and 18% more in the three years 1957-59.

This feature appears on this page every two weeks.

Future Financing

(Furnished by the Irving Trust Co from the "Financing Calendar")

DATE	COMPANY	Amount of Offering (millions) DEBT	EQUITY
MAY			
22	Consolidated Edison of N. Y.	$30.0-C	$
22	Delaware Lackawanna Western R.R.	4.0	
23	Southern California Gas	40.0-C	
23	Iowa Power & Light	7.5-C	5.6-C-rt
23	Adams Express Co.		15.0-N COM
24	Reading Co.	6-6	
28	Mountain States Telephone	25.5	
29	Chicago Northwestern	3.0	
No Date	Jacksonville Expressway	64.0	
	General Acceptance	25.0-N	
	Lockheed Aircraft	30.0-N	
JUNE			
1	Central Louisiana Electric	5.0-P	
4	Milwaukee Gas	13.0	
4	Potomac Electric Power	10.0-C	
5	Commonwealth Edison	30/50.0-C	
6	Braniff Airways		15.0-N.rt COM
6	Southern Pacific	9.7	
6	Potomac Electric Power		6.0-N COM
7	Indianapolis Power & Light	10.0-C	
12	California Electric Power		4.4-C COM
13	California Veterans	50.0	
25	Boston Edison		18.0-C-Pfd
JUNE			
No Date	Delaware Power & Light		8.0-C-rt COM
	Connecticut Power		5.2- -Pfd
	Connecticut Power		2.7- -rt COM
	American Telephone & Telegraph (after mid-June)	250.0-C	
	Public Service of New Hampshire (or July)	8.0-C	
	Southern Union Gas	10.0-N	4.0-N.Pfd
	Chesapeake and Ohio	8.1	
2nd Quarter of 1956 (Month not indicated)			
	St. Regis Paper		23.2- -rt COM
	City of Memphis—Power Plant	135.0-N	
	South Carolina Electric & Gas		5.0-p-Pfd.
	Dade County, Florida	34.5-C	
	Central Vermont Public Service	1.8-N	0.7-N COM
	Northern Indiana Public Service	12.0	
	Kansas Nebraska Natural Gas	6.0-P	
	Florida Turnpike	185.0-N	
	Jersey Central Power & Light	9.0-C	
	City of Dallas	40.7	
	Ohio Turnpike	550.0-C	
	Washington State Toll Bridge	227.0-C	
	Oklahoma Turnpike	63.0-C	
	Metropolitan Edison		5.0-C-Pfd
	Federal Land Banks	60.0	
JULY			
10	Elizabethtown Water Co	7.5-C	
11	Florida Power	20.0-C	
17	Union Electric Co	35/40.0-C	
25	Consolidated Natural Gas	30.0-C	
No Date	U. S. Governments	2/4,000.0*	
	Pacific Power & Light		9.3- -rt COM
AUG.			
15	U. S. Governments	12,500.0-R	
SEPT.			
11	Carolina Power & Light	15.0-C	
17	U. S. Governments	1/6,200.0-R	
25	Virginia Electric & Power	20.0-C	
No Date	Southern Counties Gas	15.0-C	
	Pennsylvania Tunnel	25.0-C	
3rd Quarter of 1956 (Month not indicated)			
	Ohio Power	28.0-C	
	California Toll Bridge	34.0-C	
	South Carolina Electric & Gas	5.0-P	
	Consumers Power	30.0-C	
	Northern States Power	20.0-C	
	Rochester Gas & Electric		5.0-N-Pfd
	Tampa Electric	10.0	
	Texas Eastern Transmission		15.0-N-Pfd
	Detroit Edison	60.0-C-cv-rt	
OCT.			
2	Columbia Gas System	30.0-C	
16	Public Service of Indiana	30.0-C	
No Date	Delaware Power & Light		6.0-C
	New England Power	10.0-C	
	North South Indiana Toll Road	220.0-C	
	California Electric Power	6.0-C	

Symbols—C—Competitive; N—Negotiated; P—Private; R—Refunding; cv—convertible; rt—Rights; Pfd—Preferred; COM—Common.
*Estimated.

Some companies have considered postponing debt financing because of poor market conditions. Recent improvements may encourage them to go ahead with their plans.

July looked open some time ago, but with some companies considering that month, it may fill fast.

August still seems to be quite open.

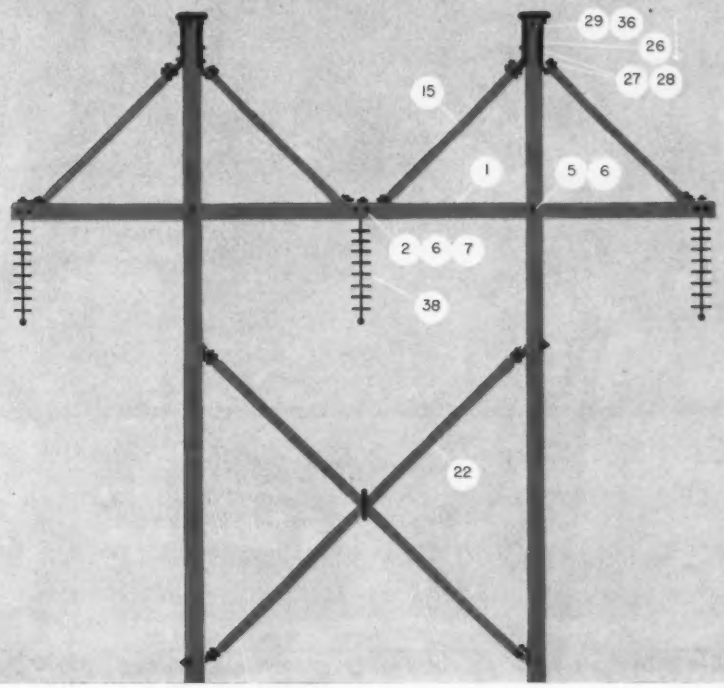
With the total volume of financing expected to be large this year, the fall again should be heavy.

Due Diligence Meetings:
May 28, Indianapolis Power & Light Co; May 29, Potomac Electric Power Co, June 1, Delaware Power & Light Co; June 28, Elizabethtown Water Co Consolidated, tentative; July 9, Florida Power Corp; July 13, Union Electric Co; and July 18, Consolidated Natural Gas Co.

TANGENT W/BRACES NO. 702

H-FRAME STRUCTURE, DOUBLE PLANK CROSSARMS WITH METAL SPACERS, POLE TOP STATIC WIRE SUPPORTS, AND WOOD CROSS BRACES DESIGNED FOR 69 TO 154 KV CONSTRUCTION

DRG. REF. #	QUANTITY	DESCRIPTION	DRG. REF. #	QUANTITY	DESCRIPTION
792	2	Pole	15	4	Vee brace 3⅜" x 4⅜" cross section
1	2	Crossarm	22	1 set	Cross brace w/fittings, clamp, ⅞" pole bolts and curved washers
2	3	Steel spacer fitting w/mounting bolts	26	2	Static wire support
5	2	Stud bolt ⅞" w/washer nuts	27	4	Machine bolt ¾"
6	8	MF locknut ⅞"	28	4	MF locknut ¾"
7	1	Bent stud bolt ⅞" x 8" w/2 sq. nuts	29	2	Clevis
			36	2	Suspension clamp for static wire
7	2	Bent bolt ⅞" x 5½" w/sq. nut	38	As required	Suspension insulators and fittings



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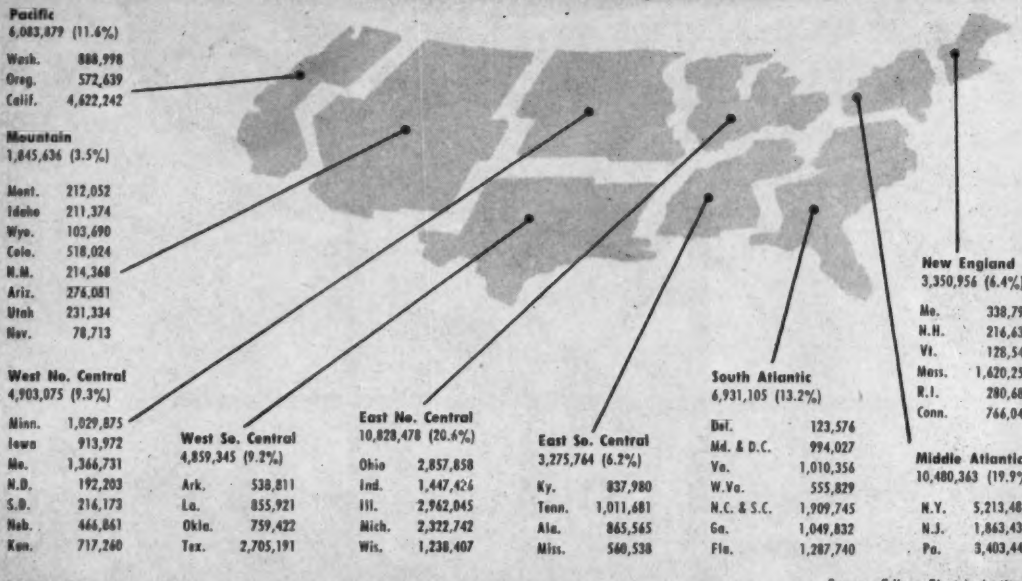
IN OVER 130 PRINCIPAL CITIES

Year-End 1955 Electric Customers by States

(Percent of Total U.S. Given After Regional Total)



Source: Edison Electric Institute

Power Statistics . . .

		Latest Month	Preceding Month	Year Ago	Annual Change %
Capacity	Mar.	116.56	115.59	104.93	11.1
Peak—Class I Systems (million kw)	Feb.	94.2	95.8	83.8	12.4
Estimated Dec. '56 Peak (million kw)	Feb.	105.56	105.45	103.31	2.2
Production—billion kwhr	Feb.	47.99	51.12	40.23	19.3
Hydro		10.63	9.36	8.57	24.0
Fuel		37.36	41.76	31.66	18.0
Sales—billion kwhr	Jan.	46.32	45.19	39.47	17.4
Residential		13.41	12.25	11.76	14.0
Commercial		7.00	6.81	6.24	12.2
Industrial		23.57	23.75	19.31	22.1
Other		2.34	2.39	2.15	8.8
Fuel Consumption	Feb.				
Coal—million tons		13.44	15.22	11.09	21.2
Oil—million barrels		7.10	8.22	7.43	−4.4
Gas—billion cu ft		67.81	68.27	63.63	6.6
Net Income Class A & B Co's—$ million	Jan.	127.26	125.72	112.21	13.4
Residential Customers—millions	12 mos.	44.51	44.41	43.24	2.9
Revenue per kwhr	ended	2.64¢	2.65¢	2.69¢	−1.9
Avg kwhr per customer	Jan. 31	2,778	2,751	2,564	8.3
Avg annual bill		$73.34	$72.63	$68.97	6.3

Business Statistics . . .

Indexes: 1947–49 = 100					
FRB Industrial Production	Mar.	145	144	138	5.1
ENR Construction Cost	April	143.2	142.8	135.7	5.5
BLS Cost-of-living	Mar.	114.7	114.6	114.3	0.4
NEMA Sales	Mar.				
Insulation materials		168	163	160	5.0
Electric appliances		120	109	117	2.6
Wholesale prices	Feb.				
Motors and generators		126.6	126.5	121.0	4.6
Transformers and regulators		131.2	131.2	127.8	2.7
Switchgear and fuses		147.5	147.5	135.4	8.9
GNP—annual rate—$ billion	1st. Qtr.	398.5	397.3	375.3	6.2

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Because of the fine operating records of our transformers we have enjoyed a great deal of "repeat business." However, if this expectation was built upon "repeat business" due to replacement, our future would be rather dreary. Utility and industrial expansion, necessitating more transformers in ever increasing ratings, creates a need for our product... and much of this need will be "repeat business."

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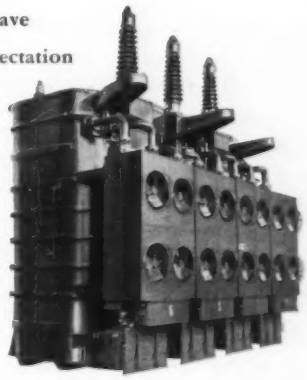

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